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among 4th grade Tier 2 intervention students

AUTHOR: Cynthia Girard

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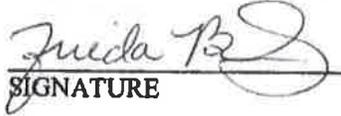
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THESIS COMMITTEE CHAIR


SIGNATURE

4-29-15
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Dr. Frieda Brands
THESIS COMMITTEE MEMBER


SIGNATURE

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Running head: TECH VS. TEACHER

Tech vs. Teacher: The academic success of instructional reading technology
use among fourth grade students in a Tier 2 intervention program

by
Cindy Girard

California State University San Marcos

April 26, 2015

Abstract

New technology is coming onto the market at an astounding pace. The introduction of new technology in education is no exception, especially with college and career readiness goals in mind. Educators must decide how to best incorporate technology into educational programs, including intervention and special education programs. The purpose of this study was to see whether or not the use of instructional reading software technology would provide more academic success for students in a grade 4, Tier 2 intervention reading program, compared to a traditional non-technological intervention model. All students were enrolled in schools in the Inland Empire, California school district. The experimental group was comprised of 13 students who used the READ 180 instructional reading software 90 minutes a day/5 days a week. The control group of students, from a different school in the same district was also comprised of 14 students who used a traditional, non-technology, small guided group intervention approach, for 60 minutes a day/5 days a week. Measures of Academic Progress (MAP) assessment was used to compare pre- and post-test results after one trimester, and the results showed that the experimental group (using instructional reading technology), had greater academic success than the control group. Moreover, the study had some limitations that may have affected the outcome.

Keywords: Tier 2 intervention, instructional technology, fourth grade, iPad, college and career readiness

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Chapter 1: Definition of Problem

My new teaching assignment began in October 2013, when I became the new Response to Intervention teacher Tier 2 (RTI 2) for grades K-5 in a non-title 1 elementary school located in the Inland Empire.

Response to Intervention (RTI) is a multi-tier approach to the early identification and support of students with learning and behavior needs. The RTI process begins with high-quality instruction and universal screening of all children in the general education classroom. Struggling learners are provided with interventions at increasing levels of intensity to accelerate their rate of learning. Students not making adequate progress in the regular classroom in Tier 1 are provided with increasingly intensive instruction matched to their needs on the basis of levels of performance and rates of progress. These services and interventions are provided in small-group settings in addition to instruction in the general curriculum (<http://www.rtinetwork.org/learn/what/whatisrti>).

I had 12 years of elementary teaching experience (grades K, 3, and 5) in schools that had a high population of low-socioeconomic, English language (EL) learners needing extensive intervention. At my new position, I had complete freedom and flexibility to identify the at-risk students who would qualify for the program, and for creating a schedule and designing an RTI 2 program with resources that support the students.

I handcrafted my own version of a pull-out response to be an intervention program, using limited resources. The school district does not currently have an adopted curriculum for intervention teachers at the K-5 level. The student group was comprised of 150 at-risk program-

eligible students, between the ages of 5 and 13. The available time for the students was based on the general education schedule (classroom time, recesses, lunches, assemblies, field trips, absences, and testing), which made the program especially challenging. I needed to design a program that would demonstrate the students' improvements, and implemented Scholastic Read 180 and piloted LexiaCore 5 for the intervention groups. In a short time, the students demonstrated impressive results. Each month, the intervention teachers from the district met to discuss how they were running their programs and discussed the results and challenges. Each teacher in the district ran the program differently, using varied resources and different schedules, without any accountability or way to measure if their particular program was working. Some used technology, guided groups, or a pull-out program, while others used a push-in model. Some teachers serviced grades 1-5, while others serviced grades 1-3 only.

As I began to explore technological intervention programs, it was apparent that each promised impressive results, equivalent to one to three years of academic reading growth in a short time with a label "common core" friendly. The programs and promises also came with huge price tags that would cost school districts thousands of dollars to have access to the software, without even addressing the outdated hardware or the need for millions of dollars' worth of wiring and Wi-Fi access to run the programs.

The experience, and the overarching need for a research-based, high quality intervention with Tier 2 support (additional instructional support for students struggling within the general education classroom who do not have an individualized educational program, IEP) prompted this research study. In the following chapters, I explore the possible impacts of two educational technology reading software programs on fourth grade students in a Response to Intervention Tier 2 setting.

Purpose of the Study

The purpose of the study is to see if specialized instructional reading software programs (like READ 180) can be used with grade 4 Tier 2 intervention students for greater academic success in reading performance, compared to traditional non-technological reading interventions. If the program shows positive reading results, it may open the door for future research into technological reading and math programs at the primary level that could produce a high-quality, research-based Response to Intervention (Tier 2) program and framework that supports the RTI Tier 2 overall concept and program goals.

Preview of Literature

The literature review in this study will provide information and explain how instructional technology works and is used in the classroom. Previous research studies have shown how instructional technology such as Lexia Reading software, READ 180 software, and iPad/iPads applications have/have not helped student's academic success.

California language arts scores are low.

In a California Department of Education (2013) news release, Tom Torlakson, State Superintendent of Public Education, discussed the results of the final STAR exam. The results showed an overall statewide drop in language arts by .8 of a percentage point from the previous year and declines were especially noted in grades 2-5. Grades 3, 4, and 5 each showed a 2% drop in language arts.

California's education technology movement.

Last year, the California Department of Education, together with State Superintendent Tom Torlakson, implemented the: "No Child Left Off-line" concept and promoted and expanded

the Partnership for 21st Century Skills (P21). Both initiatives push college and career readiness by building core skills in reading and language arts, and in the use of technological skills.

On April 18, 2014, Torlakson's Ed Tech Task Force released: Empowering Learning: Education Technology Blueprint 2014-2017. The Ed Tech Blueprint promotes technology for learning and teaching for teachers and students. In the release, Torlakson stated, "as California continues to move toward college and career readiness for every child, education technology has to be a part of what we do" (CDE website, April 2014).

One of the key responsibilities for the California Education Technology Task Force is "to make recommendations on what education technology is needed and how it should be used to improve teaching and learning and increase student success" (CDE website, April 2014).

Review of Methodology

In this study, the experimental group was comprised of grade 4 Response to Intervention (Tier 2) students (13) who used READ 180 software for three months. The control group (14 students) of fourth graders did not use instructional technology but were in a small group setting, guided for reading instruction.

This quantitative study looked at the Fall 2014 and Winter 2015 Northwest Evaluation Association, Measures of Academic Progress assessment (NWEA, MAP). The data is from two, randomly selected groups of fourth grade students who participated in intervention programs last year. Students qualified for the intervention programs if they performed below their grade level in reading. The groups were from different schools within the same district. Students who participated in an intervention program did so for a similar amount of time. The data shows reading growth based on the district benchmark assessment MAP data, over a three-month period. A quantitative, correlational research design was used to determine whether or not the

mean difference in use/non-use of educational instructional software was improved by the end of the third trimester in fourth grade reading intervention students.

A t-test of the difference was used to analyze the data with two dependent variables. The sample included 27 fourth grade reading intervention students who were selected at random. The sample of students was split into two groups: those using instructional technology program(s) in their intervention program (13), and those who did not (14).

Significance of the Study

Technology is a major component in the current nation-wide educational pendulum shift in the Common Core and college and career readiness. California schools will receive over \$1 billion to support the implementation of the Common Core and the integration of technology. This study is expected to assist educators in making informed decisions about educational technology programs that may provide the greatest outcomes, especially for intervention programs at the primary grade level.

According to the RTI network.org and the National Center for Disabilities, no particular research has been based on the RTI model, or framework, that is widely used by all schools. Schools are directed to use the three tier model to guide the intensifying of interventions and tools should be research-based and of a “high-quality”. Schools may also use their own discretion and interpretations in deciding which tools to use. Intervention teachers have been left to their own devices to borrow small components from the core curriculum, and from mainstream classrooms to supplement and support students. Previous studies have focused on Special Education, and middle and high school-specific level programs, but an urgent need exists for more research about which specific Response to Intervention programs, technological or otherwise, have been proven to be successful and of a “high quality” at the Tier 2 level in

elementary school. This study begins by examining the RTI Tier 2 research by specifically looking at instructional software programs and their effect on academic achievement among grade 4 reading intervention students.

This research explores the academic success of grade 4 students in their reading performance levels, using instructional technology in an RTI Tier 2 setting. This quantitative study addresses the following question:

- Do specialized instructional reading software programs (i.e., READ 180) show more academic success in reading performance, compared to traditional non-technological reading interventions, among fourth grade Tier 2 intervention students?

In this chapter, I review the current literature and empirical studies that specifically address how technology may or may not help fourth grade Tier 2 intervention students.

Definition of Terms

iPad: A flat, portable tablet computer made by Apple.

Apps: Small software “applications” for use on a smartphone, iPad, or computer.

READ 180: A Scholastic reading intervention software program. It is a comprehensive system of curriculum, instruction, and assessment, designed for students who are reading two or more years below their grade level. READ 180 leverages adaptive technology to individualize instruction for students and provides powerful data for teachers (Reading Intervention Software Program/Scholastic READ 180, 1996-2013, para. 1).

Lexia: An educational reading software program designed to be an essential component of every reading curriculum, Lexia Reading Core5 provides explicit, systematic, personalized learning on foundational reading skills, and delivers norm-referenced performance data without interrupting the flow of instruction to administer tests. This scalable, research-proven, technology-

based system predicts the student's year-end performance and provides teachers with data-driven action plans to help differentiate the instruction. Lexia Reading Core5 advances the development of reading skills for all students, pre-K through grade five (<http://lexialearning.com/product/>).

RTI Tier 2: Response to Intervention Tier 2 is systematic, data-driven approach to instruction that benefits every student. RtI2 integrates resources from general education, categorical programs, and special education through a comprehensive system of core instruction and tiered levels of interventions to benefit students. The CDE work group expanded the notion of RtI to RtI2, instruction and intervention to emphasize the full spectrum of instruction, from general to intensive (California Department of Education, July 10, 2013, para. 4).

Common Core: A set of clear college- and career-ready standards for K-12 in English language arts/literacy and mathematics (Common Core States Standards Initiative, 2014).

Chapter 2: Literature Review

Response to Intervention Tier 2

In August 2013, the California Department of Education reported that students in grades 3-5 had shown a 2% drop in language arts on the California Standards Test (CST) exam. With students continuing to struggle in core subjects and the recent educational pendulum shift to college and career readiness, educators need to have the very best resources and support systems to close this widening achievement gap. The California Department of Education has a Response to Intervention System (three tier) in place. The Response to Intervention Tier 2 program was designed to support at risk students, and its framework includes: high quality classroom instruction; high expectations; assessments and data collection; a problem-solving systems approach; research-based interventions; positive behavior supports; use of fidelity in program implementation; provision of staff development and collaboration; parent/family involvement as a key, and specific learning disability determination (California Department of Education, 2013).

With increasing classroom sizes, tightening budgets, and larger achievement gaps among all student groups, leaders must choose the curriculum and tailor the response to intervention programs wisely. Previous research has suggested that technology is making a difference for students in many ways. "...Using technological equipment in education has a positive effect on the academic achievement and attitudes of students" (Sevindik, 2006; Yilmaz, 2005). Rosen and Beck-Hill (2012) reported that educational technology may help to bridge the achievement gap between students and promote higher order thinking skills (p. 227). Tom Torlakson, California State Superintendent of Public Education, together with his Educational Technology Task Force, is committed to technology integration.

Educational Reading Software Programs

Lexia Reading - literature highlight: McMurray.

Lexia Reading is an educational reading software program designed to assess a student for discrepancies in reading skill, and then “prescribe” the number of minutes the student should practice the level at which they are placed in the program. Lexia offers immediate and automatic data and reports to the teacher. Based on the online description, the program seems to offer all of the components that were outlined by the California Department of Education for the RTI Tier 2 framework.

Lexia Reading Core5 provides explicit, systematic, personalized learning in the six areas of reading instruction, and delivers norm-referenced performance data and analysis without interrupting the flow of instruction to administer a test. Designed specifically to meet the Common Core and the most rigorous state standards, this research-proven, technology-based approach accelerates reading skills development, predicts students’ year-end performance and provides teachers data-driven action plans to help differentiate instruction (Personalized learning for students at all reading levels/lexia learning, n.d., para. 1).

In 2009, McMurray (2013) conducted a research study in Northern Ireland, with 53 students (age 6-7 years) in four different intervention schools for 20 weeks between November 2009 and May 2010. The struggling students were identified and then evaluated with the Lexia software. Specifically, McMurray asked: “Do pupils using the Lexia Reading program show greater progress in standardized reading test scores than pupils not using the program?” (p. 17)

The author found conclusive evidence for “a significant increase (6.78 standard points) in average reading score for the intervention group after using Lexia for 20 weeks” (p. 22). The

increase occurred in a relatively short time, with components that would fit the RTI Tier 2 framework.

Scholastic READ 180

Scholastic Corporation, the world's largest publisher and distributor of children's books and leader in educational technology and children's media (Scholastic.com, 2014, para. 4), also has a technology-driven reading intervention program called READ 180. The program, like Lexia, offers an individualized approach to reading skills practice with immediate and consistent data available for the teacher, student, and parents.

READ 180 is a comprehensive system of curriculum, instruction, assessment, and professional development proven to raise reading achievement for struggling readers in grades 4-12+. Designed for any student reading two or more years below grade-level, READ 180 leverages adaptive technology to individualize instruction for students and provide powerful data for differentiation to teachers (Reading Intervention Software Program/Scholastic READ 180, 1996-2013, para. 1).

In 2011, James S. Kim (Harvard), Lauren Capotosto (Harvard), Ardice Hartry (UC Berkeley), and Robert Fitzgerald (MPR Associates, Inc.) ran a randomized control study using the READ 180 Enterprise program with 312 students in an after-school program. Measurements were for vocabulary, reading comprehension, spelling, and oral reading fluency among students in grades 4 to 6, 95% of whom had scored below a proficiency level on the Massachusetts Comprehensive Assessment System (MCAS) in English language arts (Kim et al., 2011). The researchers chose to use READ 180 in an after-school intervention setting because Scholastic claimed the program could improve reading levels by 2 to 5 years.

An effective reading intervention program should address all areas of reading. READ 180 aims to address the diversity in student reading profiles by providing differentiated instruction in each of the components of reading: phonemic and phonological awareness, fluency, vocabulary, and reading comprehension (Kim et al, 2011).

At the conclusion of the 23-week study, students outperformed the control group of students on vocabulary and reading comprehension but not on spelling or oral reading fluency. The authors hypothesized that the lack of improvement in spelling and oral reading fluency may have been due to the READ 180 Enterprise edition not having enough opportunities for students to practice in these areas. Since that study, READ 180 has come up with an updated READ 180 Next Generation, where students can practice spelling in the “spelling zone” of the program and fluency in the “success zone”. Students self-record their oral reading passages into a microphone (scholastic.com, 2013-1996).

Technology Tools

iPads.

Many schools across the country are purchasing iPads in record numbers because they are small, portable, and widely available. Before educators make a hasty mistake; however, some current empirical research is asking if iPads are part of the solution or just another fad?

Hardware and software developers continue to promote new technological devices – most recently tablet-based computers such as iPad, as ‘magic bullets’ or ‘game changers’ to stimulate everything from major educational reform to helping raise student achievement, and schools and other educational institutions continue to be seduced by this rhetoric (Falloon, 2013, p. 505).

According to Falloon (2013),

Data indicated apps containing features or were of designs that scaffold students' interaction with content or 'stepped them through' learning concepts in a systematic and organized manner, generated more evidence of responses indicating learning than those that were primarily learning game or game/practice-based.

The most effective examples of this were found in apps that more closely resembled a traditional teaching model, often involving video of a "real" person teaching particular knowledge or skills (p. 512).

In any case, iPads are not without their issues, which can lead to frustration and a loss in instructional time. The issues with iPad apps can range from excessive pop-up ads on the free versions, high costs for licenses, limited accessibility for numerous students at a given time, and run time or WiFi issues (Falloon, 2013). In fact, current research has shown that iPad use may not show a significant difference when they are used in daily instruction. Carr (2012) studied grade 5 students (n=104) (quantitative, quasi-experimental study) in Virginia to see if daily iPad use during math instruction would improve student test scores. Two grade 5 classrooms participated in the study from different schools. One group used iPads daily during math instruction for at least one activity, and the other group did not. "These iPad activities included, but were not limited to playing game-based learning applications, reviewing presentations, accessing online video tutorials, or using interactive manipulatives" (p. 270).

The results for the pre- and post-tests showed that students had made gains; however, no significant difference was seen in comparisons of iPad use or non-iPad use during math instruction (Carr, 2012).

McClanahan (2012) reported a case of how game-based reading technology had a huge impact in reading scores. Her study suggested that the one-on-one instructional opportunity with iPads, along with working at a student's own pace, makes a difference. "CAI (computer-aided instruction) offers one-on-one, tailored instruction that is self-paced, often along with the novelty of game formatting, which promotes engagement and attention" (p. 21). In this case study, Josh, a fifth grade boy diagnosed at an early age with ADHD, had struggled most of his educational career with reading. He attended Sink Public School, a rural school in Oklahoma, which was limited in resources and services for students with reading deficiencies. By the time Josh reached fifth grade he had fallen so far behind (2nd grade reading level) that he and his teachers had given up hope. Josh's intervention teacher, Kristen, incorporated the iPad into his reading intervention program. Kristin was able to easily download specific applications to drive his reading intervention program. The author indicated that "Kristen and Josh met together at least twice a week for 20 minute sessions in which the iPad figured prominently as a presentation method for content and strategies" (p. 24). Game-like lessons covered the reading interventions that involved context clues, flash cards, e-books for comprehension, vocabulary, phonics, and a recording device to improve fluency (McClanahan, 2012).

The results were staggering. In a matter of six weeks, Josh had improved one full grade level in reading ability. "The thing that seems to have made the difference was the use of the iPad as a mediator of the intervention" (cited in Raggie & Chronis, 2006, p. 25). The author of the study concluded that, "teachers involved in Response to Intervention programs, [should be encouraged] to consider experimenting with tablet computers to allow students to gain insight into their reading" (McClanahan, 2013, p. 27).

Connections/Conclusions

The literature shows that technology may be a good tool for helping students, depending on how it is used, by whom, and for what reason. School districts need to be careful when purchasing technology since hastily purchased technology and apps may rely heavily on “hype and fad” and turn out to be a disappointing experience (Falloon, 2013). Many of the studies address the shift in education and the benefits of technology, especially for one-on-one support. Lexia Reading software seems to be effective, based on the study of six and seven year olds from a Northern Ireland school. It was also successful in an intervention setting with Josh, who improved by an entire grade reading level in a matter of a month and a half.

The READ 180 Enterprise edition showed results in the areas of vocabulary and comprehension, but not in spelling and fluency. More studies are needed to determine how specific reading software programs can affect students’ reading levels in a Response to Intervention (RTI) setting.

The following chapter highlights the design and methodology for programs leading to academic success for reading levels among fourth grade students in an RTI setting using the Scholastic READ 180 instructional software.

Chapter 3: Methodology

The purpose of this study was to see if the use of specialized instructional reading software programs, like READ 180, could cause greater academic success in reading performance than traditional non-technological reading interventions among fourth grade Tier 2 intervention students.

Design

This quantitative study looked at the Fall 2014 and Winter 2015 Northwest Evaluation Association, Measures of Academic Progress assessment (NWEA, MAP) data. The results of two, randomly selected groups of fourth grade Tier 2 intervention students were evaluated. The control group was comprised of 14 students who participated in a non-technological intervention program. The experimental group was comprised of 13 students who used instructional software technology within their intervention program. Students qualified for the intervention programs if their performance was below their grade level in reading. The groups were from different schools within the same district, and both groups of students had been participating in their intervention program for the same amount of time. The data shows reading improvement based on the district benchmark assessment and MAP data over a three month period. The reading performance scores were analyzed (pre- and post-test) using the district's MAP benchmark assessment and the Mann-Whitney test to compare changes in scores to see if there was a significant change between intervention groups.

The purpose of this design was to answer the following research question:

- Do specialized instructional reading software programs (i.e., READ 180) show more academic success in reading performance, compared to traditional non-technological reading interventions, among fourth grade Tier 2 intervention students?

This study looked for significant differences between the two RTI Tier 2 groups by comparing pre- and post-MAP benchmark assessment data for a group that used/did not use the READ 180 instructional reading software within their intervention program.

Participants

Student participants were selected according to each school's at-risk RTI Tier2 program qualification process. The demographics for each group varied according to the enrollment.

Non-technology intervention group (control).

Students in the control group received reading intervention support 60 minutes a day/5 days a week with a credentialed teacher. The teacher taught instructional reading skills such as fluency, phonics, and comprehension in a small group guided practice setting. New concepts, however, were introduced and practiced in the whole group on occasion. This fourth grade intervention group was made up of 14 students. Students were enrolled in the intervention program in August of 2013 and took the MAP Fall Reading benchmark assessment in September 2013 (pre-test) and the MAP Winter Reading benchmark assessment January 2014 (post-test).

Technology-based intervention group (experimental).

Students in the experimental group received reading intervention support using the Scholastic READ 180 software technology program, 5 days a week/90 minutes a day. This fourth grade intervention group consisted of 13 students. Students were enrolled in the intervention program in August of 2013 and took the MAP Fall Reading benchmark assessment in September 2013 (pre-test) and the MAP Winter Reading benchmark assessment in January 2014 (post-test).

Setting

Two intervention programs (RTI) with fourth grade students were studied. The control group (14 students) used a traditional reading intervention approach with guided reading practice in a small group setting. The experimental group (13 students) used the READ 180 instructional software in an individualized setting. Both programs were used in two different schools within the same school district. Students participated in their respective intervention program for approximately 5 hours a week over a period of one semester (3 months).

Students in both programs took the Fall Reading Map test (pre-test), and one semester later, they took the Winter Reading MAP test (post-test). This setting was conducive because our district offers RTI Tier 2 programs with intervention teachers at all school sites and every site runs the program in a different way, some with technology and others with traditional methods. Not all schools within the district currently have access to READ 180, because the district purchased a limited number of licenses.

Materials

In this study, the MAP pre-test and post-test assessment data was used. The interventions included the READ 180 software and instructional reading best practices at the teacher's discretion. These instruments were appropriate for providing the quantitative data to show cause and effect relationships between the two fourth grade RTI Tier 2 groups.

Procedures

The two schools in the school district with a 4th grade intervention Tier 2 program were randomly selected. The experimental intervention group used the READ 180 instructional software with fidelity, for 90 minutes a day/5 days a week. The control group participated in

their intervention program according to the teacher's best practice model. The students in the control group were comprised of small guided groups, except for the whole group that was present when new concepts were introduced: 60 minutes a day/5 days a week. The district administered a Reading benchmark assessment (MAP), three times a year for all students in grades 2-5. The MAP Fall 2013 assessment data was recorded and used as the pre-test. Students participated in the Tier 2 intervention program for one trimester. The MAP Winter 2014 assessment data was recorded and used in the post-test analysis.

Analysis

The analysis compared the pre- and post-test MAP assessment results to determine the following:

- Did greater gains in the levels of reading performance occur in either the experimental or the control group, shown by the Reading level performance after students participated in a Tier 2 intervention program with/without instructional software technology?
- Did a significant difference in reading performance occur from using instructional software technology (READ 180) in a Tier 2 intervention setting compared to the control group that did not use software?

The MAP reading test assesses the following areas: word recognition, structure and vocabulary, reading literature, key ideas, reading for understanding, craft, structure, evaluation, and informational text. The Rasch Units (RIT) scale is used to measure a student's academic growth over time. Like units on a ruler, the scale is divided into equal intervals and it is independent of grade level. The RIT scale is broken into performance levels: Advanced, Proficient, Basic, Below Basic, and Far Below Basic (Northwest Evaluation Association, 2012).

Limitations

The validity of the study may be affected by several limitations. The small sample size could affect the outcome of the study, and the diversity of instructional reading challenges within each intervention program may be vastly different from one another. The instructional time per week that students participate in the intervention program is not the same, which may affect the outcome. While the students are from the same district, their demographics may not be the same.

Chapter 4: Data Analysis

This section presents the results of the reading intervention program in the same school district that used intervention Tier 2 approaches. One school used a traditional small group, guided reading approach (control group) for their fourth grade intervention program and the other school used instructional software, READ 180, (experimental group) with their fourth grade intervention students. The district's benchmark data was used to analyze the two groups. The independent variable was the intervention program (with or without instructional technology) and the dependent variable was the reading performance level (MAP scores). The groups were assessed by the district benchmarks (MAP) after one semester in the program and a year and a half after initial enrollment in their respective intervention programs. Statistical tests were used to determine whether or not significant differences existed between the gains in performance for the intervention groups (instructional technology vs. traditional).

Data Presentation

MAP RIT scale.

The MAP reading test assessed the following areas: word recognition, structure and vocabulary, reading literature, key ideas, reading for understanding, craft, structure, evaluation, and informational texts. The Rasch Units (RIT) scale measured a student's academic growth over time. The scale is divided into equal intervals and is independent of grade level. The RIT scale is broken into performance levels: Advanced, Proficient, Basic, Below Basic, and Far Below Basic (Northwest Evaluation Association, 2012).

Results

The MAP Reading results for the 13 students who used the READ 180 program are shown in Figure 1.

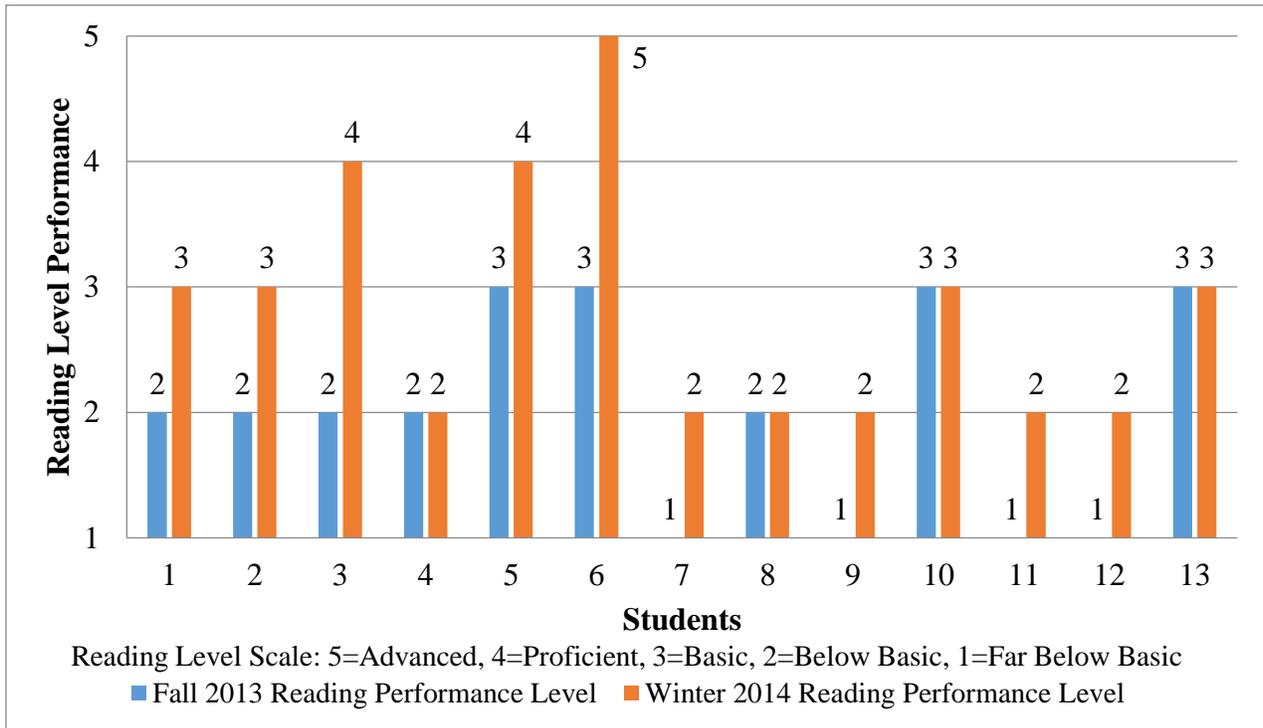


Figure 1: Experimental group: individual reading pre- and post-test MAP benchmark assessment results.

From Figure 1, four students had the same level of proficiency in the pre-test and the post-test, seven students improved by one level of proficiency, and two students improved by two levels of proficiency. If we count total increases in levels of proficiency for the 13 students, the total gain is 11 levels of proficiency for the class. If, for example, each student had gained 1 level of proficiency on the MAP post-test, the total would be 13 levels gained.

The MAP Reading results for the 14 students who did not use the READ 180 program are shown in Figure 2.

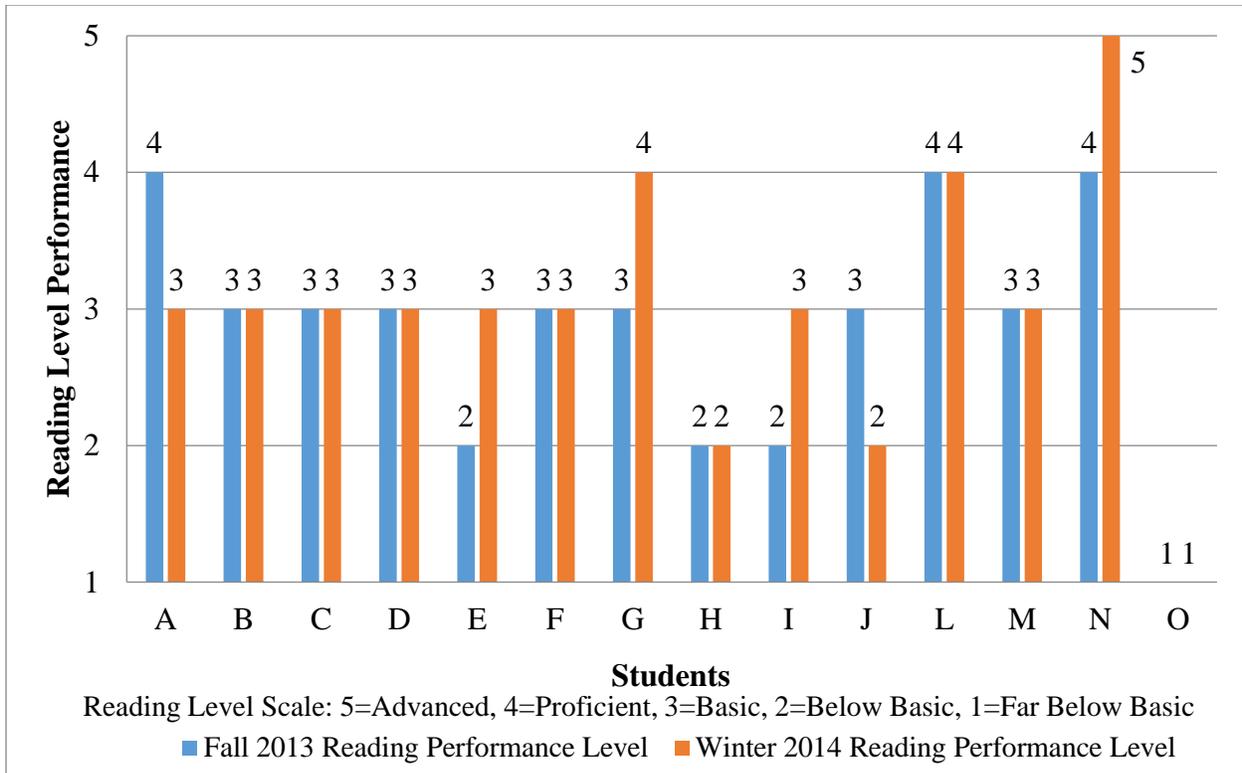


Figure 2: Control group: individual reading pre- and post-test MAP benchmark assessment results.

From Figure 2, eight students had the same level of proficiency from the pre-test to the post-test, four students improved by one level of proficiency, and two students dropped one level of proficiency. Overall, the total increase in levels of proficiency for the 14 students was 2 levels of proficiency for the class.

Table 1 shows the levels gained according to the frequency of student performance change scores:

Table 1: Change in performance between experimental (tech) and control (non-tech) groups.

		Change in performance			
Experimental (tech)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	4	30.8	30.8	30.8
	1.00	7	53.8	53.8	84.6
	2.00	2	15.4	15.4	100.0
	Total	13	100.0	100.0	
Control (non-tech)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-1.00	2	14.3	14.3	14.3
	.00	8	57.1	57.1	71.4
	1.00	4	28.6	28.6	100.0
	Total	14	100.0	100.0	

The experimental group did not have any negative values (i.e., decrease in performance), while four students had scores that were unchanged, seven students increased by one level, and two students increased by two levels. In the control group, two students decreased in performance by one level, while eight students had no change, and four students improved by one level.

To test for the significance of these differences between the experimental (tech) and the control (non-tech) groups, a Mann-Whitney U test was conducted (Table 2).

Table 2: Mann-Whitney U test for significance in difference between experimental/non-experimental group.

	Fall 2013 Reading Performance Level	Winter 2014 Reading Performance Level	Change in performance
Mann-Whitney U	44.500	77.500	46.000
Exact Sig. [2*(1-tailed Sig.)]	.022 ^b	.519 ^b	.029 ^b

a. Grouping Variable: Tech

b. Not corrected for ties.

This test was used because the dependent variable (MAP) scores were ordinal in nature. The test indicated that the difference was significant ($U=46.0$, $p=.029$), and that the change in performance level was significantly higher in the technology assisted group ($p < .05$). The post-test scores were similar enough to be non-significant. The change in performance (.029) indicates that the students in the tech group had significantly more change (increase) in their scores.

Summary of Results

Overall, the experimental READ 180 group was found to have significantly better performance gains ($U=46.0$, $p=.029$), compared to the control group, with a total performance increase of 11 levels. Whether or not the instructional software used in the intervention program was the direct cause of the significant performance gains in the experimental group is not known with certainty, and other factors, like sample size, demographic differences, difference in the duration of instruction for the programs, and testing conditions may have also contributed to the findings.

Chapter 5: Conclusions and Recommendations

The purpose of this study was to evaluate the effectiveness of instructional reading software technology in a Tier 2 intervention setting in terms of the academic success of fourth grade students. This chapter summarizes the research findings and interpretations, discusses the limitations, and recommends future research directions.

Summary of Findings/Interpretations

The experimental group was found to have an increased reading performance level after only one trimester, using the READ 180 instructional software in their intervention program (gain of 11 performance levels, with significance of $U=46.0$ and $p=.029$).

The reviewed literature indicates that instructional technology is making a difference for students since software programs, such as READ 180, can provide one-on-one instruction based on identified, individual needs that gives direct and immediate feedback to the student. Game-based instructional technology not only keeps students engaged and motivated to practice, but it is self-paced.

Limitations

One of the main limitations in this study was the small sample size. Each of the sample groups had fewer than 15 students. If the samples had included more students from more than just two schools, the larger scale would have allowed for more confidence in the conclusions and a greater understanding. The study also evaluated only one instructional software program, the READ 180. If other reading instructional technology programs had been included, more insightful findings may have been obtained. Finally, the diversity and instructional reading needs of the two sample groups may have had differences that could have affected the findings.

Future Research and Direction

With new and costly educational technology entering the market making big claims, and the push for more instructional technology to be used in the classroom, more research is needed to provide school district leaders with information for making informed decisions about interventions. In the future, research questions should consider:

- Which reading software programs provide the best instruction for intervention students in the areas of phonics, fluency, vocabulary, spelling, writing, and comprehension?
- Which reading/math software programs provide the best instructional support/practice and outcomes at the best price/student?
- How can the replacement of traditional paper/pencil homework with instructional technology software program homework practice benefit students?
- Which reading instructional software programs best meet the needs and provide the best outcomes for students at specific grade levels?
- To what degree can instructional technology bridge the achievement gaps among diverse populations of students?
- How can instructional technology support students to move toward college and career readiness?

Summary/Conclusion

Instructional technology integration is a key for supporting intervention reading students. Teachers are often challenged in meeting the diverse needs of every student, every day, and in every way, to close the education gaps and allow all students to achieve their greatest performance. Similarly, the school districts are being challenged to find which resources would best serve their students' academic needs, as they must face tight budgets and limited research/information. With more staff development, use of PLC time to focus on the

implementation of the READ 180 program, and additional support, the schools would be able to serve more students who need intervention. Benchmark assessments should be used regularly to measure the academic success from the use of intervention programs and instructional technology resources.

Based on the literature, the findings of this study, and personal observation, the reading instructional software (READ 180) in a Tier 2 intervention program is a valuable resource that contributes to greater academic reading success among students in Tier 2 intervention.

References

- California Department of Education. (August 30, 2013). Retrieved from <http://www.cde.ca.gov/ds/>
- California Department of Education. (July 10, 2013). Retrieved from <http://www.cde.ca.gov/ci/cr/ri/rticorecomponents.asp>
- California Department of Education. (n.d.). Retrieved from <http://www.cde.ca.gov/nr/ne/yr14/yr14rel39.asp>
- Carr, J. (2012). Does math achievement h'APP'en when iPads and game-based learning are incorporated into fifth-grade mathematics instruction? *Journal of Information Technology Education: Research* (11), 269-286.
- Common Core States Standards Initiative. Retrieved from <http://www.corestandards.org/wp-content/uploads/FAQs.pdf>
- Empowering Learning: Education Technology Blueprint, 2014-2017. Retrieved from <http://www.cde.ca.gov/eo/In/documents/yr14bp0418.pdf>
- Falloon, G. (2013). Young students using iPads: App design and content influences on their learning pathways. *Computers & Education*, 505-521.
- Kim, J. S., Capotosto, L. C., Hartry, A., & Fitzgerald, R. (2011), Retrieved from http://scholar.harvard.edu/files/jameskim/files/2011-eeпа-kim-r180-sedl-year1_website.pdf
- Lexia Reading. Retrieved from <http://lexialearning.com/product>
- McClanahan, B. (2012). A breakthrough for Josh: How use of an iPad facilitated reading improvement. *TechTrends: Linking Research and Practice to Improve Learning*, (3), 20-28.

McMurray, S. (2013). An evaluation of the use of Lexia reading software with children in Year 3, Northern Ireland (6 to 7-year olds). *Journal of Research in Special Educational Needs*, 13(1), 15-25.

Northwest Evaluation Association. Retrieved from <https://www.nwea.org/>

Personalized learning for students at all reading levels/lexia learning. (n.d.). Retrieved from <http://lexialearning.com/product/core5>

RTI Action Network. Retrieved from <http://www.rtinetwork.org/learn/what/whatisrti>

Reading Intervention Software Program/Scholastic READ 180. (1996-2013). Retrieved from <http://read180.scholastic.com/reading-intervention-program/about>

Rosen, Y., & Beck-Hill, D. (2012). Intertwining digital content and a one-to-one laptop environment in teaching and learning: Lessons from the time know program. *Journal of Research on Technology in Education*, 44(3), 225-241.

Scholastic.com. (2014). Retrieved from <http://www.scholastic.com/aboutscholastic/>

Scholastic.com. (2013-1996). Retrieved from <http://read180.scholastic.com/reading-intervention-program/about>

Sevindik, T. (2006). *The effect of smart classrooms on the academic achievement and behavior of students of high education* (Unpublished PhD thesis). Firat University, Institute of Social Sciences, Turkey, Number of Thesis: 204626.

Yilmaz, M. (2005). *The effects of using educational technologies in teaching symmetry to success and attitude in 7th class of primary school* (Unpublished master's thesis). Marmara University, Institute of Educational Sciences, Turkey.