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The Effect of the I-ready Reading Program on Student Scores on the Northwest Evaluation Association (NWEA®) Measures of Academic Progress (MAP) Reading Assessment

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THE EFFECT OF THE I-READY READING PROGRAM ON STUDENT SCORES ON THE
NORTHWEST EVALUATION ASSOCIATION (NWEA®) MEASURES
OF ACADEMIC PROGRESS (MAP) READING ASSESSMENT

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DEDICATION

For my immediate family…Mom (Liz), Dad (Al), and Sister (Brenda)…The fact that this

accomplishment is taking place is a testament to our work as a whole to go from the bottom to

the top.

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ABSTRACT

The purpose of this study was to examine the effect on student scores on the Northwest

Evaluation Association (NWEA®) Measures of Academic Progress (MAP) Reading Assessment

when students are engaged with on-line adaptive diagnostics and instruction via the Curriculum

Associates (CA) i-Ready Reading on-line platform. Outcomes were explored based on usage of

the i-Ready program, ethnicity (Hispanic, or Non-Hispanic), and sex (male, or female) of the

participant. Participants were students in a K-8 environment in an urban setting in the Mid-West

United States. There were two groups of students: one group who used the i-Ready Reading

program by CA, and the other who did not. The students who used the program did so based on

the discretion of the school principal. Students who were chosen were exposed to the same core

curriculum and quality of teacher was controlled for using 2015-2016 summative teacher ratings.

Data collection included baseline spring 2016 NWEA® MAP Reading scores, and summative

spring 2017 NWEA® MAP Reading scores. The data used were from the 2016-2017 school

year. Fixed Effect (FE) Linear Regression was used for the analysis. In general, students who

used the i-Ready Reading Program by CA demonstrated lower spring 2017 NWEA MAP

Reading Assessment scores than students who did not use the program.

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CHAPTER I

INTRODUCTION

At the start of the 2016-2017 school year, the Luis Munoz Marin Dual Language

Academy (LMM), a school in the Cleveland Metropolitan School District (CMSD) in Cleveland,

Ohio, began to use the i-Ready program from Curriculum Associates (CA). According to their

website, the i-Ready program is grounded in the use of an adaptive diagnostic using the Rash

Model of Item Response Theory (IRT), in addition to on-line instruction. Essentially, students

take an adaptive diagnostic, and then spend time engaging in on-line lessons aligned to their

needs as determined through the adaptive diagnostic. CA provides guidance as to the minimum

amount of time a student should spend engaging in content via the on-line platform, and also

provides guidance and information about passage rates with regard to embedded assessments. If

a student is not passing lessons within the program, it is suggested that a teacher intervene with

the student. Many schools around the country use the program as a form of intervention.

Intervention refers to providing supplemental instruction to students to close skill and knowledge

gaps that may exist.

During the 2016-2017 school year, principals within the CMSD were allowed to

determine how to best serve their students' needs, and were given some control over budget, and

intervention and enrichment programs. This was seen as a continuation of the Cleveland Plan

(CP), which was originally set to end at the end of the 2016 academic year. Starting in 2012, the

CP was law adopted by the State of Ohio as a means to turnaround schools in the CMSD,

without undergoing state takeover. As is the case, principals could review programs and options

and make decisions regarding what they wanted to use for intervention and / or enrichment. At

LMM, during the 2016-2017 academic year, the administrative team decided to use the i-Ready

program as a means of intervention and enrichment for students. The administrative team was

composed of the school principal, other school based administrators, and teacher leaders. The

administrative team made the decision based on the need for individualized intervention and / or

enrichment for students, and a search into programs able to provide these needed supports. It

was determined that all students who take state standardized assessments would use the program

as determined by CA. Since the program uses an adaptive diagnostic, it determines placement of

students based on current performance. Thereafter, the on-line lessons should provide

enrichment for students who may be performing above grade level, and intervention for students

who may be performing below grade level.

　　　While CA provides schools and their administrative teams with reports and data

indicating the effectiveness of the program, they use data points from their own internal data

measures to make this justification. As noted in CA's impact study released in 2017, increases in

i-Ready diagnostic scores, based on use of the program as directed, were used to explain an

increase in student achievement. While CA states the i-Ready diagnostic scores are valid and

reliable based on their sample size and IRT statistical analysis, considering the cost associated

with the program, it is beneficial to consider student growth and achievement via another

assessment. Taking this into consideration, and the fact that CMSD already has students take the

NWEA® MAP Reading Assessment, the data gleaned from the NWEA® MAP Reading

Assessment, may be used to further refute or confirm positive effects from the use of the i-Ready

program.

Statement of the Problem

      CMSD has been one of the lowest performing school districts in the state of Ohio since

state report cards were introduced for public schools based on 2003-2004 academic year results.

In 2012, as means to combat looming state takeover and continued poor performance, in

conjunction with the state of Ohio, CMSD had legislation passed with the state titled the

Cleveland Plan (CP). The overall goal of the CP was to remove low performing schools and

create new schools in the hopes that this would create a district of high performing schools (The

Cleveland Plan, 2012). The CP was set to run until 2016, at which point the plan was to be fully

realized and the district deemed no longer to be failing. In 2016, the plan was extended by the

state of Ohio and further time was granted to CMSD, as it was said that progress was being

made, but that the district was still not quite where it needed to be.

      The CP held that school autonomy was of utmost importance in the race towards school

reform. Within these school autonomies, school leadership teams are charged with developing

the instructional models that best fit their schools and the particular needs of their students. As

such, in general, core curricular decisions are made by the district, but programs for enrichment

and / or intervention could be chosen at the building level. The problem exists where within this

autonomy, there does not exist a repertoire of research at the district level to provide guidance

and / or limitations with regard to program selections for school leaders and their leadership

teams. The question this poses is whether certain programs are effective at closing gaps with

CMSD students? Of particular interest to this study is the i-Ready Reading program.

While the i-Ready program has reports and an established research base, much of that data used to justify the effectiveness of the program is based solely in their own diagnostic, assessment, and data tools (Curriculum Associates, 2017). While CA states that their diagnostic scores are valid and reliable based on sample size and statistical methods used, this begged the question as to the program's effectiveness should another assessment measure be used as the means of determining achievement. Ultimately, there is great cost and responsibility associated with intervention, decision making, and implementation of programs in CMSD, and the need to know if the program was truly viable for the CMSD students required further research.

Purpose of the Study

Along with flexibility in curricular choices, comes accountability. In considering the implications of the CP, much confidence is placed on school leaders and their teams to make decisions that will increase student achievement. In the absence of an increase in student achievement, a gap exists in the implementation of the CP, and should be addressed. Furthermore, given cost considerations for intervention and enrichment programs, the ability to have research that confirms a program's effectiveness is important for schools.

Significance of the Study

Given the intent of the CP to create high performing schools district-wide, and the autonomies provided to school leaders, research on instructional programs was necessary. Of particular interest was the i-Ready Reading program from CA, as it is widely used across the district. This study compared a school using the program vs. a school not using the program within CMSD, to determine the effectiveness of the program. The results of this study were important as there exists great financial, and professional responsibility on schools and their leadership teams, and the results can be used to help make decisions around instructional

programs in their efforts to fulfill the intent of the CP.

Background on the i-Ready Program

The i-Ready program was developed by CA as a means of on-line assessment and instruction. The program uses an adaptive diagnostic to find exactly where a student is performing academically, and then creates a learning path for the student. This learning path includes on-line instruction that provides lessons and embedded assessments for students As students complete lessons, and pass embedded assessments, they then move forward on to the next set of skills they should master to be considered proficient. The program is used as a blended learning model by many school districts, and is seen as means to provide individualized intervention, and / or enrichment to students. Blended learning refers to the use of face-to-face teacher instruction, and on-line instruction. When implemented with fidelity, students take a baseline diagnostic in the fall, a growth check assessment approximately eight weeks later, a second diagnostic in the winter, followed by another growth check, and a final diagnostic in the spring. Additionally, CA suggests that students spend a minimum of 45 minutes a week using the program, and teachers are charged with checking students' passage rates in the lessons and embedded assessments with which they engage. Ultimately, usage of the program with fidelity is said to close student skill gaps and be an individualized instruction tool leading to higher student achievement.

Background on the NWEA® MAP Reading Assessment

According to their website, the NWEA® is a research-based, not-for-profit organization. They work to develop Pre-K–12 assessments to measure student growth and proficiency. The results gleaned from these assessments can, in turn, be used to predict student proficiency on state assessments, and student growth. For this study the NWEA® MAP Reading Assessment

was used as a measure of student achievement. NWEA® (2016) describes MAP as interim assessments that are administered in the form of a computerized adaptive test (CAT). The assessments can be used from grades K-12 in the areas of Math, Reading, Language Usage, and Science. For the purpose of this study the reading assessment was utilized. Additionally, it is important to note that MAP are vertically scaled across grades, which allows for academic achievement growth to be measured. The MAP assessment scores are reported using a Rasch Unit (RIT) scale with a range from 100 to 350. Each subject area assessment has its own RIT score scale, and studies are periodically conducted to ensure RIT scores align to grade level equivalents for the purpose of measuring growth (NWEA®, 2016). For example, in 2015 a RIT Scale norming study was conducted using multi-level growth models on approximately 500,000 longitudinal test scores from over 100,000 students in order to establish nationally representative norms (Thum, & Hauser, 2015). Based on the established set of national norms and vertical alignment of the NWEA® MAP Reading Assessment, the score results can be used from pre to post-tests to gauge student academic growth in reading.

Overview of Methodology

This study used quantitative methods. An ex post facto research design was used with a causal-comparative approach. The study examined the effect of the i-Ready Reading program on student scores on the NWEA® MAP Reading Assessment. A comparison was conducted between students who were exposed to, and used, the i-Ready Reading program, and students who did not. Baseline data were taken from the spring 2016 NWEA® MAP Reading Assessment, and growth measured using spring 2017 NWEA® MAP Reading Assessment. In order to control for teacher effectiveness, the 2015 – 2016 teacher's final summative overall effectiveness ratings were used. This measure included both a combination of quantitative

student growth measures (SGMs), and the results of qualitative teacher observations. Teachers

can receive a final summative rating of accomplished, skilled, developing, or ineffective. With

regard to core English Language Arts (ELA) curriculum and instruction, both schools sampled

used the same core curriculum, and followed the district's literacy block. The district's literacy

block included elements of modeled instruction, shared practice, and independent work, which

includes digital literacy. Scranton school was selected as a peer model based on similarities to

LMM in terms of percent of Special Education, percent of English Language Learners, number

of students per class, location on the West Side of Cleveland, and Socio-Economic Status (SES).

To ensure appropriate sample size, effect size software was used. This was done as an *a priori*

power analyses (Cohen, 1988), whereby sample size *n* =91 was computed as a function of the

required power level of .80 and an alpha of .05 (Faul, Erdfelder, Lang, & Buchner, 2007).

Statistical analysis via Fixed Effects (FE) Linear Regression was conducted. The FE

model was utilized as it permits the individual to be used as their own control to see the effect in

score changes on the NWEA® MAP Reading Assessment between the two groups of students on

two occasions. Additionally, sex (male, or female) and ethnicity (Hispanic, or non-Hispanic)

were considered in the statistical analysis. Particular attention was given to Hispanic student

results as they formed a large part of the sample, and data are limited when considering ethnicity

and achievement, and specifically examining the Hispanic demographic. In order for the

difference in NWEA® MAP Reading Assessment scores to be considered statistically

significant, a value of p <.05 was used.

Research Questions

The three quantitative research questions were as follows:

1.   Is there a difference in NWEA® MAP Reading Assessment scores for students who used

the Curriculum Associates i-Ready Reading program, compared to students who did not use the program?

2. Is there a difference in the amount of change in NWEA® MAP Reading Assessment scores based on ethnicity (Hispanic vs. non-Hispanic) when using the Curriculum Associates i-Ready Reading program, as compared to students who did not use the program?

3. Is there a difference in the amount of change in NWEA® MAP Reading Assessment scores based on sex when using the Curriculum Associates i-Ready Reading program, compared to students who did not use the program?

Limitations and Delimitations of the Study

The most relevant limitation of this study was the testing conditions for the administration of the NWEA® MAP Reading Assessment. While CMSD has established rules and policies for administering the NWEA® MAP Reading Assessment, a centralized proctoring team does not exist to ensure implementation occurs in exactly the same way across and within schools. Another limitation of this study was the subjective nature of teacher performance via the TDES process, or the qualitative observation portion of the summative rating. While training and calibration exercises were conducted to standardize the process, there is an air of subjectivity that exists within the process, and ultimately the observation results rely on an evaluator's opinion against a rubric standard. While this is true, the study also included a quantitative component via a teacher's Student Growth Measures (SGMs) to help combat this construct. The researcher chose to impose some delimitations on the study itself. Since the study is specifically looking at groups of students within the CMSD on the West Side of Cleveland, there existed a narrowed and targeted population of students. As such, to a certain extent, the final analysis and

results of this study may not be generalizable beyond the schools studied.

Definition of Key Terms

On-line Adaptive Technology: Adaptive technology is used a means to adjust questions and / or instructional paths for each individual students based on how they answer or perform on assessments and lessons.

NWEA®: "Northwest Evaluation Association". A research-based, not-for-profit organization that creates assessment solutions to measure student growth and proficiency. (NWEA, 2016).

i-Ready Program: Program developed from CA that combines the results of an adaptive diagnostic, and on-line individualized K-8 instruction to move students towards mastery of content.

Fixed Effect Linear Regression: "FE Linear Regression." Linear model in which the individual is used as their own control.

CMSD: "Cleveland Metropolitan School District." School district serving the City of Cleveland located in Northeast Ohio.

Summary

The purpose of this study was to examine the effect on student scores on the NWEA® MAP Reading Assessment when students were engaged with on-line adaptive diagnostics and instruction via the CA i-Ready program. Student groups from LMM and Scranton school were used as the sample. The student groups consisted of two groups of students: one was exposed to the i-Ready program by CA, and the other was not. Students who were chosen were exposed to the same core curriculum, and literacy block, with the only exception being use of the i-Ready program. Teacher quality was controlled for via the use of 2015 – 2016 final summative teacher ratings. Data collection included baseline spring 2016 NWEA® MAP Reading Assessment

scores, and summative spring 2017 NWEA® MAP Reading Assessment scores. The data used

were from the 2016-2017 school year. In order to conduct the statistical analysis, FE Linear

Regression was used.

CHAPTER II

LITERATURE REVIEW

Introduction

School performance and student achievement remain important topics of discussion throughout the United States. Theories abound as to how to turn around underperforming schools. Places such as the Cleveland Metropolitan School District (CMSD) have undertaken legislation such as the Cleveland Plan (CP) to provide an answer to these questions. Within the CP is the autonomy for school level leaders to determine how to best serve the needs of their specific population of students. One such way certain leaders are looking to turn around low performing schools within the CMSD is through the use of the i-Ready Reading program from CA. The program provides on-line intervention and/or enrichment to students, in addition to assessment. Curriculum Associates (CA) asserts that the program is based on the use of adaptive technology, and that it incorporates the best practices of: real world scenarios, explicit instruction and feedback, and interactivity and a gradual release of responsibility. Furthermore, in specifically looking at their on-line reading program, CA puts a focus on foundational skills such as phonological awareness, phonics, and high frequency words, in addition to vocabulary development, and reading comprehension (Curriculum Associates, 2015).

In conducting a review of literature, a deeper look into the CP was necessary. Additionally, a clearer understanding around CA's i-Ready Reading program, including indicated best practices and skills taught, and an examination of the use of technology with students in urban settings was necessary. Furthermore, a search for relevant studies specifically addressing the i-Ready program served as evidence to the lack of current research and evaluation of the program. In searching Cleveland State University's library and academic databases, such as Education Resources Information Center (ERIC), only one article appeared that dealt with the i-Ready program, and that article revolved around action research, and specifically looked at math programming. Understanding the key elements of school turn-around, and the lack of research into the i-Ready Reading program, a review of literature was conducted to expand and detail these concepts.

The Cleveland Plan and School Turn-Around

The CP was legislation enacted in 2012 as means to combat what was seen as consistent failure in the CMSD, and also prevent state mandated takeover. Essentially, the goal was to engage in school-turnaround, or in the larger conversation, eliminate low performing schools. In general, school-turnaround is an umbrella term used to describe the ability to take schools that historically perform poorly on standardized test-based performance, and increase their results. (Dee, 2012). The actual piece of legislation is known as House Bill (HB) 525 from the 129th Ohio General Assembly. HB 525's intended purpose was to amend certain sections of the Ohio Revised Code (ORC). Specifically, HB 525 (2012) was enacted to:

> Revise the management of municipal school districts and community schools located within municipal school districts; to permit the establishment of a Municipal School District Transformation Alliance; to expand the offense of bribery to cover directors, officers, and employees of the Alliance; and to authorize municipal school districts to

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levy property taxes the revenue from which may be shared with partnering community schools (p. 1).

While this statement does not seem as if it is referring to district or school turn-around, embedded within the legislation were certain provisions and revision to the ORC, which allowed flexibility for change. In delving deeper into the specific sections of HB 525, it becomes apparent that the intent was actually school-turn around. Some of the specific areas addressed within HB 525 include:

- access to community school enrollment data

- parental involvement and a requirement that parents of students in the district attend one annual parent teacher conference or similar event

- the Chief Executive Officer's (CEO) authority on low performing schools, and the ability to take corrective action on the district's lowest performing schools

- measures of accountability which requires the district to create performance measures of student achievement, progress, and college and career readiness

- the creation of Student Advisory Committees for schools with grades 9 - 12.

- the use of proceeds from the sale of district facilities being used for the district's general funds

- the ability to exercise waiver authority to request to have certain rules or statutes waived by the state superintendent

- contract flexibility with regard to contracts offered to teachers to include changes to timelines for renewing and continuing contract decisions for teachers, reduction in force, and termination language

- the establishment of a differentiated salary schedule based on performance

- the use of building level hiring teams to fill teaching positions

- a change to the teacher and principal evaluation system focused on academic

  performance

- the creation of a Transformation Alliance

- the sharing of local property ax

As is evidenced via this extensive list, many provisions were embedded in HB 525 to try to provide further autonomy at the local level to the CMSD (The Cleveland Plan, 2012). One of the hallmarks granted the CEO was the decision making ability to grant further autonomy at the school level. The intent and thought was that through stronger autonomy at the building level, principals and their leadership teams would be able to better address the needs of students and experience the intended turn-around.

Embedded within these autonomies at the school level, was a control over budgets, and intervention and enrichment programming. Many principals in the CMSD began to use the i-Ready program from CA to fulfill this need. The i-Ready program is an on-line assessment and instruction tool that includes individualized learning pathways and an adaptive diagnostic. The end goal of building level administrators was to increase student achievement, and in effect realize school turn-around. Specifically, the i-Ready Reading program purports the use of evidence-based practices, adaptive technology, and foundational skill acquisition. Herein, further research on these elements of the program will be examined.

i-Ready Adaptive Technology, On-line Instruction, and Diagnostic Assessment

The i-Ready program states that it uses adaptive technology during its assessment process. When students begin to use the i-Ready program, they are initially administered a diagnostic assessment that levels the student. This leveling is aligned to a vertical progression of standards from Kindergarten through 12th grade. The results of the adaptive diagnostic

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assessment create an individualized learning pathway for students aligned to the standard progression. Furthermore, the results of the diagnostic allow for baseline measurement to track student growth against standards, and can be used to assist teachers in designing classroom instruction (Curriculum Associates, 2015). The ability to provide classroom instruction at a student's current level is seen as central to increasing student achievement. Additionally, the i-Ready Reading program is an on-line platform that uses the diagnostic data to create individualized on-line learning pathways and lessons for students in reading. For example, a student's current performance level may contain gaps in certain academic skills, and knowledge of this can provide a springboard towards closing these gaps (Jiménez & Gersten, 1999).

In specifically looking at the reading diagnostic, CA looks to gauge student levels in the areas of phonological awareness, phonics, high frequency words, vocabulary, and comprehension. CA explains that the on-line system uses an adaptive structure that makes adjustments as students answer questions in order to increase or decrease the challenge level of the questions presented, thereby providing an accurate measure of a student's current academic level. Additionally, diagnostic results provide both scale and norm scores for students. Scale scores look at scores as a continuum to allow educators to compare students across grade bands. Norm scores provide educators with a relative measure of how students are performing compared to peers nationwide. In order to derive these scores, CA uses the adaptive technology model describe above, in conjunction with a Rasch Item Response Theory Model (RIRTM). The use of this model allows for the prediction of student success on certain questions based on level of difficulty. Furthermore, CA details that they have conducted field-testing with over 2,000,000 students, which in conjunction with the RITRM, and adaptive technology allow for greater

reliability and validity regarding the norm and scaled score results of the diagnostic (Curriculum Associates, 2014).

Real World Scenarios

In addition to the use of adaptive technology and diagnostic assessments, CA employs the use of real world scenarios. They note that presenting content in this manner allows for:

- students to connect new learning with prior knowledge

- lessons linked to student interests so as to provide a real world connection

- increased engagement due to the use of real-world themes and interactive settings. (Curriculum Associates, 2015).

The use of real world scenarios is supported as a best-practice in engaging students, and therefore increasing student achievement in the long-term. The use of a student's prior knowledge allows for new learning to stick and ground itself in things a student already knows and is able to do. Prior knowledge is not always necessarily previous academic content, but can also include previous real-world experiences, or interests (Pollock, Black, & Ford, 2012).

Explicit Instruction and Feedback

Research into reading instruction supports the idea of explicit instruction and feedback. Explicit instruction and feedback refers to direct and specific instruction for students that includes models and explanations, followed by time for students to practice the new concept. Research supports and discusses the use of direct explicit instruction in both vocabulary acquisition and reading comprehension (Swanson, Vaughn, & Wexler, 2017). Furthermore, research supports explicit instruction in phonological awareness, phonics, and high-frequency words, which are all components of foundational literacy, and early reading (Foorman & Moats,

2004). Feedback in this sense refers to 'in the moment' corrective instructions. Studies show that while feedback has little effect on long-term retention when students provide correct answers, feedback following an incorrect response greatly increases student's long-term retention of skills and concepts (Pashler, Cepeda, &Wixted, 2005). CA states the the i-Ready program delivers direct explicit on-line instruction with feedback through the lesson pathways provided. The assertion is that the experience a student has combines the elements of models and explanations, and then allows student time to practice the new skill introduced. Furthermore, based on student responses feedback is provided to correct misconceptions and reteach, and then permit additional practice. Should a student continue to fail to demonstrate mastery, an indication will be provided to the teacher that the student may require more intense face-to-face one-on-one direct instruction (Curriculum Associates, 2015).

Interactivity and Gradual Release of Responsibility

The i-Ready Reading program's on-line lessons are created to continually keep students engaged. The program embeds tools which require students to make a decision at least every thirty seconds, for example a click. CA believes that similar to real life, they must keep students consistently engaged. While the developers may have their own notions as to what students deem engaging, it should be noted that research does support the idea of student engagement and gaming. Game developers often use strategies when creating games to ensure engagement, and these strategies and ideas can essentially be used for educational games to encourage engagement (Dickey, 2005). In addition to embedded engagement strategies, the i-Ready Reading program also attempts to employ the strategy of a gradual release of responsibility. Gradual release of responsibility is the idea of relinquishing control over to students for them to work with and practices new concepts in a measured and forward moving manner. It is similar

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to providing students with a little bit more responsibility as they demonstrate they have acquired new skills and knowledge (Pearson, & Gallagher, 1983). CA feels they embed this idea by having students first see a model of a concept, followed by guided instruction, the practice of new skills, and then an assessment to check skill mastery (Curriculum Associates, 2015).

Foundational Reading Skills

The i-Ready Reading program contends that both diagnostic testing and instruction are developed in such a way to address not only foundational literacy skills, but also to assess and teach vocabulary and comprehension (Curriculum Associates, 2015). Nationwide, most states have adopted some version of the Common Core State Standards (CCSS). The CCSS specifically point to foundational reading skills being taught in grades Kindergarten through 5th grade. Furthermore, the CCSS Initiative (2018) lists and defines the overarching foundational skills as:

- print concepts – know and understand the basic ideas of print

- phonological awareness – understanding of syllables, words, and sounds

- phonics & word recognition – ability to decode words, and recognize commonly used words

- fluency – ability to read with accuracy and appropriate pace to be understood

As students move from foundational reading skills grades, the standards shift and look for students to interact with higher-level informational and literary texts. The primary goal of the literacy standards once students are in grades six through twelve is for students to read to learn. As such, much of the standards focus around the ideas of comprehension and vocabulary acquisition. For example, in contrast to foundational literacy skills, the overarching ideas in grades six through eight include:

- key ideas and details – main points within a text

- craft and structure – know and understand meaning of words and features and how text is presented

- integration of knowledge and ideas - understand charts, figures, facts, and opinions

- range of reading and level of text complexity – reading social studies and science texts on grade-level (Common Core State Standards Initiative, 2018).

Use of Technology with Students in Urban Settings

As part of school turn-around, many support the use of technology as a means by which to increase student achievement. The i-Ready Reading program is a form of on-line instructional technology, and as such the big ideas surrounding the use of technology with students in urban settings will be explored. The idea of technology takes on many forms in schools today. For example, some schools consider the use of desktop computers a form of technology integration, while others argue that the use of an on-line instructional platform constitutes a use of technology. While this contention exists, it should be noted that both examples provide models of how some schools choose to use technology. In considering the research relevant to a study of the CA's i-Ready program in the CMSD, it is important to consider and examine school technology use, particularly for students in urban settings. Herein some of the challenges and benefits of the use of technology in urban settings will be discussed.

In urban settings, technology use can have a contentious existence. For example, some settings lack the resources altogether, while in other settings technology is inappropriately used as a reward for behavior rather than a tool for education. Additionally, some find that technology ends up being used to replace customary methods of instruction (i.e. creating

slideshow presentations vs. lectures). While these statements are true, in order for technology to actually be effective, it must be used as a meaningful tool to engage students and assist them in learning (O'Hara, 2014). This is important when one considers that evidence exists of student appreciation of technology in schools when it is used for self-directed creative purposes as opposed to teacher directed activities. Furthermore, the use of technology can be seen as a means to create active engagement (Shady, 2014). Understanding these ideas, it is important for school leaders in urban settings to examine how technology is used when available. Failing to examine the use of technology can lead to gaps in use and intended purpose.

In furthering the discussion on the challenges of technology use in urban settings, one cannot proceed without acknowledging the notion of the homework gap. As more schools continue to move towards technology integration, its use now extends beyond the traditional school day into the realm of homework. It should be noted that teachers can assign lessons in the i-Ready program outside of the traditional school day as homework. As such, one of the plagues of technology integration in urban settings is the notion of homework gaps Meyers (2016) writes, "Disparity in home Internet service has lead to the "homework gap," where economically disadvantaged students "go from a digital oasis to a digital desert when they go from school to home," as Chike Aguh, CEO of EveryoneOn described it" (para. 3). So, while technology is being used a means to increase student achievement and engage students, in some realms it is actually proving to be counter-productive. As is the case in some urban settings, the lack of appropriate technology outside of school can actually lead to a widening of knowledge and skills gaps where technology is required to complete assignments.

While challenges and gaps exist in the use of technology in urban settings, research in general finds that it can have a positive effect. There exists contention among researchers as to

the necessary conditions and relational connection of positive effects, but nonetheless positive

evidence exists (Ahn, Beck, Rice, & Foster, 2016). Understanding this is important for school

leaders looking for ways in which to potentially increase student achievement. With regard to

technology integration in urban settings, the overarching theme is not so much centered around

technology, but moreover the way in which it is employed. Current literature demonstrates that

when technology is used to engage students in creation and self-determined activities, its use is

more effective than when it is used as a means to modify traditional teaching methods. For

example, students appreciate the autonomy to research and create using technology, vs. merely

attend to a slideshow presentation. Understanding this research provides a basis as to the use of

technology in urban settings.

Summary

In 2012 HB 525 was passed by the 129th Ohio General Assembly. This legislation is

more commonly referred to as the CP. The main goal of the CP was to increase student

achievement in the CMSD. One of the main tenets of the plan was the notion of more autonomy

at both the district and school level. In granting autonomy at the school level, building leaders

and their instructional teams were granted more control over budgets and decisions around

instructional materials for intervention and enrichment. One tool that many school principals

began to use was the i-Ready Reading program from CA. The program is an on-line platform

used for both assessment and instruction. The program uses adaptive technology and RIRTM to

place students at their current performance levels, and allow educators to receive norm and

scaled scores for students. CA believes that this data allows for students to then receive an

individualized pathway for their learning. Furthermore, CA explains that they build their

platform on research-based practices that include: real world scenarios, explicit instruction and

feedback, and interactivity and a gradual release of responsibility. Additionally, CA details how

they address reading skills aligned to the CCSS. This review of literature presents why some

school-based leaders in the CMSD chose to use the i-Ready Reading program. Furthermore, it

confirmed, via research, some of the assertions made by CA as to the value of the embedded

instructional practices of the program. Finally, it discussed the use of technology by students in

urban settings. Essentially a gap existed in the research as to whether the program had an effect

on reading achievement given these factors, and this study addressed this gap.

CHAPTER III

METHODOLOGY

This chapter presents the method of research for the study. The researcher used a quantitative methodology. Included within this discussion is the rationale for quantitative methods, an explanation of the ex post facto design for quantitative research, and the description and justification of the setting and participants for the design. Furthermore, a presentation of the procedures are presented along with the limitations and delimitations of the study.

The three quantitative research questions were as follows:

1. Is there a difference in NWEA® MAP Reading Assessment scores for students who used the Curriculum Associates i-Ready Reading program, compared to students who did not use the program?

2. Is there a difference in the amount of change in NWEA® MAP Reading Assessment scores based on ethnicity (Hispanic vs. non-Hispanic) when using the Curriculum Associates i-Ready Reading program, as compared to students who did not use the program?

3. Is there a difference in the amount of change in NWEA® MAP Reading Assessment

scores based on sex when using the Curriculum Associates i-Ready Reading program, compared to students who did not use the program?

Rationale for Quantitative Methods

In looking to study the assertions made by CA regarding the effectiveness of the i-Ready program, it was determined that the best means by which to conduct this analysis was via quantitative methods. Since the original analysis conducted by CA was done using quantitative statistics, it is only logical that this study used quantitative methods to analyze the effect of the i-Ready program. It should be noted that quantitative research stems from positivist philosophical roots, is experimental, empirical, numerical and statistical in nature, and allows for confirmation and hypothesis testing (Merriam, 2009). Given the characteristics of quantitative research, and the understanding that the original CA study regarding the effectiveness of the i-Ready program, it becomes evident that an evaluation of the i-Ready program would be conducted using quantitative methods.

Ex Post Facto Design for Quantitative Research

An ex post facto line of inquiry refers to research conducted after-the-fact. As such, it can be determined that interference from the researcher did not occur (Salkind, 2010). Given this, it can be said that an ex post facto design is a form of causal-comparative research. Causal-comparative research refers to a study conducted with two or more groups and one independent variable (Gay, & Airasian, 2003). Furthermore, it allows for a hypothesized cause-effect relationship to be explored, but does not intend to make cause-effect conclusions. Understanding this construct, and that the groupings of students whose data were used for this study existed prior to the application of the intervention, and that they were not randomly assigned to control groups, it can be determined that the study was a quasi-experimental design (Warner, 2013).

While it is rare for a study to be ex post facto and causal-comparative, and also be quasi-experimental, in this case there was a matched comparison (control) group, there was implementation of a treatment, and there was an attempt to account for other variables. While this type of research design is seen as valid it is not without limitations. When one considers an ex post facto design, it should be noted that research points to three main potential gaps. In no particular order, areas of concern with ex post facto designs include:

- a lack of randomization

- one may run the risk of over-interpreting results, and hence come to faulty conclusions

- the researchers inability to fully manipulate the independent variable

Although these limitations exist, educational research often lends itself to a more ex post facto approach as compared to an experimental design (Kerlinger, 1986). Furthermore, while the researcher understands the underpinnings of the potential limitations, there was an expectation that confidence be placed in the quasi-experimental design.

Setting and Participants for Quantitative Design

The data for this quantitative study were collected from the CMSD. The CMSD is located in the Mid-Western United States and is the public school district that serves the city of Cleveland. According to the most recent statistics presented via the Ohio Department of Education website, the district had an enrollment of 38,949 students during the 2016 - 2017 school year. One hundred percent of students enrolled for that school year received free or reduced lunch. Additionally, 9.2% of students were coded as English Language Learners, while 21.8% of students were coded as students with special needs. The per pupil expenditure for that academic year was $11,054.

In order to conduct the study, students were sampled from Luis Munoz Marin Dual Language Academy (LMM) in the CMSD, and Scranton school. Given the parameters below, and to ensure appropriate sample size, all students whose data were available were included. A comparison was conducted between students who were exposed to, and used, the i-Ready program, and students who did not. To find a sample of students who were not exposed to the i-Ready program, another school within the CMSD that used the same English Language Arts (ELA) core curriculum, and balanced literacy block was identified. Additionally, to control for teacher effectiveness, results of the Teacher Evaluation and Development (TDES) system were used in addition to a teacher's overall effectiveness rating per State of Ohio guidelines, which also includes Student Growth Measures (SGM). To determine this information, overall effectiveness results were pulled from the 2015-2016 school year. Results from this year were used as this is the year prior to the 2016-2017 school year from which the i-Ready program was measured via NWEA® MAP Reading Assessment results, because one of the assessments used for SGM is the NWEA® MAP Reading Assessment. Since this assessment can be used to help create the model of teacher effectiveness, the researcher could not use data from the same years $(2016 - 2017$ school year) to analyze the effect. To control for school effects, the results of a model comparison were used. In the CMSD there is a statistical process by which schools are clustered according to demographic, enrollment, and location information. This information provides a score that then allows for schools to be clustered into comparison schools based on the relative proximity of the scores when plotted, and is referred to as the peer schools model (N. D'Amico, personal communication, 2018). An *a priori power analyses* was done (Cohen, 1988), whereby sample size $n = 91$ was computed as a function of the required power level. (Faul, Erdfelder, Lang, & Buchner, 2007).

Data Analysis Procedure for the Quantitative Study

A Fixed Effects (FE) Linear Regression model was used as the means of statistical analysis. The Fixed Effects model used the individual as their own control. While there were some assumptions regarding changes during the period with which the data were collected, much of those assumptions in this study were controlled for via the selected sample based on teacher effectiveness and school chosen. The study fulfilled the requirements of the FE Linear Regression model since the study was an ex post facto design and complied with the two general requirements:

- the dependent variables (DV), in this case NWEA® MAP Reading Assessment scores, were measured on two occasions
- the predictor variable changed across the two occasions for a significant portion of the sample

Additionally, sex and ethnicity were considered in the statistical analysis. It should be noted that they were considered as a category by which to pull a sample, and not as a variable effect that may change over time (Allison, 2009). Furthermore, they were part of the analysis as a way to compare success by subgrouping. With regard to the variable ethnicity, a student is considered Hispanic if the parent of the student identifies the student as Hispanic on the CMSD student enrollment form. (J. Cedeño, personal communication, 2019). Hence, non-Hispanic is used for students of various races who are not identified as Hispanic via the student enrollment form. Also, the variables sex and ethnicity were included in the original analysis but were nonsignificant and created some multicollinearity because of the presence of the variables and the interactions, so the variables were removed since they weren't specifically answering one of the research questions. In order for the difference in NWEA® MAP Reading Assessment scores

to be considered statistically significant, a value of $p < .05$ was used. The variables were measured as follows:

- NWEA® MAP Reading Assessment scores – a Rasch Unit (RIT) scale with a range from 100 to 350

- ethnicity – nominal – non-Hispanic – which included white, black, Asian or pacific islander, American Indian or Alaskan native, or multiracial – or Hispanic

- sex – nominal – dichotomous – biological female or biological male

- primary independent variable (IV) – nominal - dichotomous – used i-Ready Reading Program or did not use the program

Limitations and Delimitations for the Quantitative Study

While controls were in place to assure validity and reliability, limitations and delimitations for the quantitative study existed. One of the limitations of this study was the inability to control testing conditions for the administration of the NWEA® MAP Reading Assessment across schools. While CMSD has established rules and policies for administering the NWEA® MAP Reading Assessment, a centralized proctoring team does not exist to ensure implementation occurs in exactly the same way across and within schools. Another limitation of this study was the subjective nature of teacher performance via the TDES process. While the process is standardized, the results ultimately rely on an evaluator's opinion against a rubric. While this is true, a quantitative component was used via a teacher's SGM. The SGM was chosen from the 2015-2016 school year to prevent a statistical error in which data that could be used for the DV is not also used as a control. Another potential limitation of the study involved the use of a FE method, as there can be a statistical error since the within-individual data is exclusively used. While FE excludes the between-individual effects, the use of controls within

the study, meaning sample selection based on school and teacher similarities, controlled for some of this between-individual variance, and decreased any potential errors. Finally, limitations exist with ex post facto designs in general. For example, ex post facto designs lack randomization, pose a risk of interpreting results incorrectly, and present challenges for the researcher to fully manipulate the independent variable. The researcher chose to impose some delimitations on the study itself. The study specifically looked at groups of students within the CMSD on the West Side of Cleveland. Since the study was conducted in this manner, there existed a narrowed and targeted population of students. As such, the final analysis and results of this study may not be generalizable beyond the schools studied. A further delimitation to the quantitative design that was imposed by the researcher is the effect being measured relative to the i-Ready program's impact, and results on the NWEA® MAP Reading Assessment. While the assessment results are not solely a measure of the program, the use of these scores presented the most accurate data available via this assessment.

Summary

A quantitative research deign was ideal for this study for multiple reasons. The intent of the study was to see if the CA i-Ready program indeed had a relationship to student achievement as evidenced via the NWEA® MAP Reading Assessment scores. CA internal research indicated that the program indeed produced a positive effect, but no outside assessments were used in making this assertion. As such, and given that their analysis was done via quantitative statistics, this study measured the effect using an outside assessment, and also used quantitative methods. Furthermore, an ex post facto design was used whereby existing data were pulled after the fact to compare students who used the program, and students who did not use the program.

Considerations such as school and teacher were used as controls in selecting the sample.

Statistical analysis was conducted via a FE Linear Regression.

CHAPTER IV

RESULTS

This research study addressed the effectiveness of the i-Ready Reading program while used at Luis Munoz Marin Dual Language Academy (LMM) in the Cleveland Metropolitan School District (CMSD) during the 2016-2017 academic year. Specifically, the study looked to see if there was an effect on student achievement via a positive change in student reading scores on the Northwest Evaluation Association (NWEA®) Measures of Academic Progress (MAP) Reading Assessment. The goal was to see if a positive change in MAP Reading scores existed to determine whether the use of the i-Ready Reading program fulfilled the intent of the Cleveland Plan at increasing student achievement via principal autonomy at the school level. Quantitative data and methods were used to examine the effect on MAP Reading Assessment scores of students who used the program and those who did not. This was done by analyzing NWEA MAP Reading assessment scores of two different schools – one that used the program and one that did not - from spring 2016 to spring 2017 via Fixed Effects (FE) Linear Regression.

Quantitative Data Analysis

The data analysis addresses the three research questions:

1.   Is there a difference in NWEA® MAP Reading Assessment scores for students who used the Curriculum Associates i-Ready Reading program, compared to students who did not use the program?

2.   Is there a difference in the amount of change in NWEA® MAP Reading Assessment scores based on ethnicity (Hispanic vs. non-Hispanic) when using the Curriculum Associates i-Ready Reading program, as compared to students who did not use the program?

3.   Is there a difference in the amount of change in NWEA® MAP Reading Assessment scores based on sex when using the Curriculum Associates i-Ready Reading program, compared to students who did not use the program?

The data analysis of this causal-comparative, ex post facto research compared two groups of students. The first group consisted of students were exposed to and used the i-Ready Reading Program. The second group consisted of students who did not use the i-Ready Reading Program. For the purpose of this study, both groups of students chosen were exposed to the same core English Language Arts curriculum, and quality of teacher.

Assumptions of Regression

Prior to FE Linear Regression analysis, the normality of the dependent variable was assessed. This was done via the creation of a histogram of the Spring 2017 NWEA® MAP Reading Assessment scores. As is depicted in the histogram (see Figure 1), the dependent variable is approximately normally distributed, with a slight negative skew. Additionally, variances in spring reading score (dependent variable) across levels of each independent variable were examined using standardized residual plots, and all were found to have homogeneous variance across levels (see Figure 2). Next, the normality of the distribution of residuals was

examined. According to the Shapiro-Wilk test, the residuals distribution was not normally

distributed, (530) = .955, $p < .001$. The researcher transformed the variable in various ways (log

transformation, square root), but transformations did not change the nonnormality of the

distribution of residuals.

Score Distribution
Spring 2017 NWEA® MAP Reading Assessment
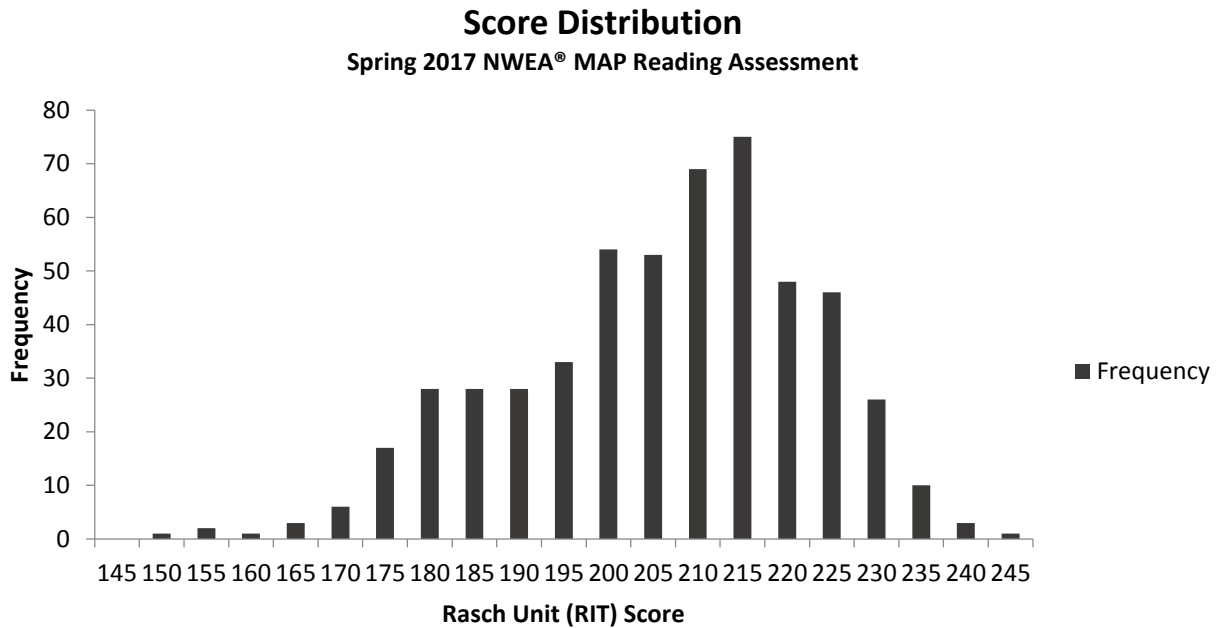
Figure 1. Histogram depicting distribution of spring 2017 NWEA® MAP Reading assessment

scores.

According to Warner (2013), "In general, empirical distribution shapes are considered

problematic only when they differ dramatically from normal" (p. 153). Hence, this is not

necessarily an essential assumption to fulfill, since the actual assumption for the regression is

that the *theoretical* residuals are normally distributed and we cannot tell that from our sample

data. But to be sure that the results were not affected by this, the analysis was conducted in

various other ways to ensure the results were consistent. Other methods included doing simple

independent t-tests to check differences between raw means, and then computing a change score

as the dependent variable instead of including both pre- and post-test scores. All resulted in the same conclusions.
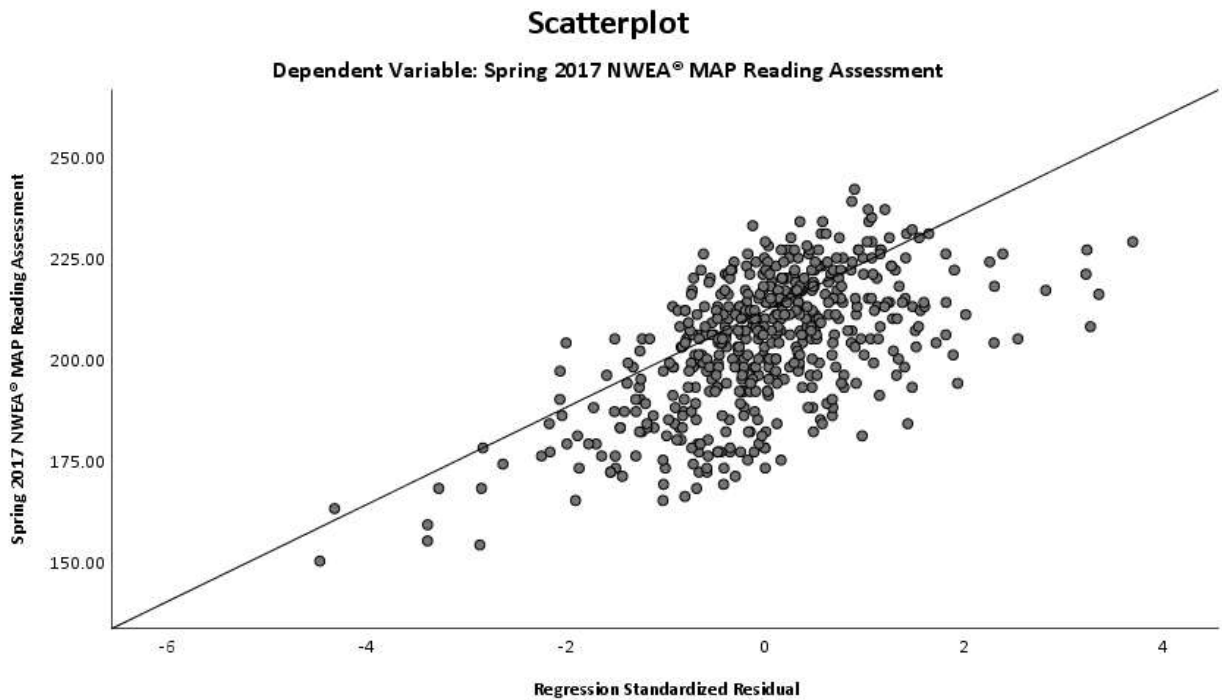
Figure 2. Scatterplot depicting standardized residual of spring 2017 NWEA® MAP Reading assessment scores.

District and Study Sample Demographics

The data for this quantitative study were collected from the CMSD. The CMSD is located in the Mid-Western United States and is the public school district that serves the city of Cleveland. According to the statistics presented via the Ohio Department of Education website for the 2016-2017 academic year, the district had an enrollment of 38,949. The racial breakdown of the students enrolled as reported by the Ohio Department of Education website is as follows:

- white (non-Hispanic) – 15.7%

- black (non-Hispanic) – 64.5%

- Hispanic – 15.8%

- Asian or pacific islander – 1.3%

- American Indian or Alaskan native – .2%

- multiracial – 2.6%

One hundred percent of students enrolled for that school year received free or reduced lunch. Additionally, 9.2% of students were coded as English Language Learners, while 21.8% of students were coded as students with special needs. The per pupil expenditure for that academic year was $11,054.

For this study, the sample was pulled from LMM and Scranton school in the CMSD. This determination of peer school was made via the peer schools model used with the CMSD. The peer school model clusters schools according to demographic, enrollment, and location information. This information provides a score that then allows for schools to be clustered into comparison schools based on the relative proximity of the scores when plotted. (N. D'Amico, personal communication, 2018). 533 participant scores were received, of which 530 were used as three scores did not provide school identification. To be included in the analysis, the students must have attended the school for a full academic year (FAY), and have a spring 2016 and spring 2017 NWEA® MAP Reading Assessment score. In general, a FAY means a student attended the school from at least the end of the first week of October of the academic year until the administration of spring assessments of that same school year. During the 2016-2017 school year, the FAY began on October 10, 2016. For the purposes of this study, FAY would have ended with the spring 2017 administration of the NWEA MAP Reading assessment, which in this case was February 27, 2017. Taking into consideration this time period, and time students did not receive regular instruction for various occasions, such as calamity days, field trips, and

breaks, the researcher used a minimum minute usage of at least 450 minutes. Only students who

engaged in on-line instruction via the i-Ready Reading program for 450 minutes or more were

considered as having used the program and included in the analysis. While this was the

minimum usage required to be considered part of the sample, it should be noted that greater than

fifty percent of the participants who used the program had usage of more than 700 minutes.

With regard to sex, there were 135 male participants who attended LMM, which constituted

25.47% of the sample, and 122 male participants who attended Scranton, which constituted

23.02% of the sample. There were 134 female participants who attended LMM, which

constituted 25.28% of the sample, and 139 female participants who attended Scranton, which

constituted 26.23% of the sample. With regard to ethnicity, 198 participants were Hispanic and

attended LMM, or 37.36% of the sample, and 186 participants were Hispanic and attended

Scranton, or 35.10% of the sample. There were 71 non-Hispanic participants who attended

LMM, or 13.39% of the sample, and 75 non-Hispanic participants who attended Scranton school,

or 14.15% of the sample. Regarding school, 269 participants attended LMM, or 50.8% of the

sample, and 261 participants attended Scranton school, or 49.2% of the sample (see Table I).

Table I

Frequency and percentages of sample by sex, ethnicity, and school (n =530)

Demographic Information	Frequency	Percentage
Sex		
Female at LMM	134	25.28
Female at Scranton	139	26.23
Male at LMM	135	25.47
Male at Scranton	122	23.02
Ethnicity		
Hispanic at LMM	198	37.36
Hispanic at Scranton	186	35.10
Non-Hispanic at LMM	71	13.39
Non-Hispanic at Scranton	75	14.15
School		
LMM	269	50.80
Scranton	261	49.20

Mean Score Changes

In order to confirm the results of the regression, exploratory analysis was conducted. This was done by analyzing mean score changes. The change in mean scores on the NWEA® MAP Reading Assessment scores were examined between spring 2016 and 2017 (see Table II). Three independent sample t-tests were conducted to examine mean 2016 scores, mean 2017 scores, and the changes in scores. In general, there was not a significant difference in spring 2016 mean NWEA® MAP Reading Assessment scores for Scranton school ($M = 198.20$, $SD = 21.14$) compared to LMM ($M = 197.48$, $SD = 15.33$); t (474) = .448, $p = .655$. In general, there was a significant difference in spring 2017 mean NWEA® MAP Reading Assessment scores for Scranton school ($M = 206.49$, $SD = 16.32$) compared to LMM ($M = 201.49$, $SD = 16.26$); t (528) = 3.542, $p < .05$. In general, the change score was significantly higher for Scranton school than LMM conditions; t (528) = 4.467, $p < .05$ (see Table II).

Table II

Group statistics for mean change score by school and year (n =530)

	n	Spring 2016 mean NWEA® MAP Reading Assessment scores	Spring 2017 mean NWEA® MAP Reading Assessment scores	Mean Change
Scranton (did not use the i-Ready Reading program)	261	198.20	206.49	8.29
LMM (did use the i-Ready Reading program)	269	197.48	201.49	4.01

Fixed Effect Linear Regression Model

The primary independent variable of interest for this study is whether or not the student used the i-Ready Reading Program. Use of the program is labeled as school in the descriptive statistics, and LMM was coded as one for the analysis, and Scranton school was coded as zero. The dependent variable is the NWEA® MAP Reading Assessment scores, which consist of a Rasch Unit (RIT) scale with a range from 100 to 350, with a control for the reading scores prior to beginning the program. Additionally, the nominal variables of ethnicity (Hispanic, or non-Hispanic) and sex (male, or female) were included in the analysis. Ethnicity and sex were used as a means of determining whether reading scores changed more for particular subpopulations of students. Additionally, they were transformed and calculated as an interaction variable with school. Hispanic was coded as one, and non-Hispanic was coded as zero. Female was coded as one, and male was coded as zero. To control for outside factors, the Independent Variable of Spring 2016 NWEA® MAP Reading Assessment scores was used. Additionally, 2015-2016

teacher summative ratings were included, and are listed as effectiveness. Effectiveness ratings were coded as a three for a summative accomplished rating, two for a summative skilled rating, and one for a summative developing rating. There were no teachers rated as ineffective overall. The FE Linear Regression model equation for the study was

$$Y1 = 67.018 + -.177 (Sex\ x\ School) + .360 (Ethnicity\ x\ School) + -5.459 (School)$$
$$+ -1.175 (Effectiveness) + .719 (Spring\ 16\ RIT)$$

The overall model was significant, $F (5, 524) = 199.620$, $p < .05$. In general, Spring 2016 NWEA MAP Reading Assessment scores were a significant predictor of Spring 2017 NWEA MAP Reading Assessment scores, $t (524) = 30.33$, $p < .05$. The single most important predictor is spring 2016 NWEA MAP Reading Assessment scores and it is significant along with school but it has the highest absolute value standardized beta coefficient at $\beta = .80$. In general, for every increase of one in Spring 2016 NWEA MAP Reading Assessment scores there is an approximate increase of .72 in Spring 2017 NWEA MAP Reading Assessment scores (see Table III).

Question One: Change in NWEA® MAP Reading Assessment Scores

The first research question sought to uncover whether use of the i-Ready Reading Program from CA correlated to a positive effect in student achievement via a change in NWEA® MAP Reading Assessment scores. To determine the effect, a Fixed Effects (FE) Linear Regression model was used. Use of the program is labeled as school in the descriptive statistics, and LMM was coded as one for the analysis, and Scranton school was coded as zero. Table III shows the descriptive statistics for the dependent variable NWEA® MAP Reading Assessment Scores. In general, School is a significant predictor of Spring 2017 NWEA MAP Reading

Assessment scores, t (524) = -3.551, p <.05. While school is significant, the absolute value

standardized beta coefficient was less than that of spring 16 at β = .17.

Table III

Descriptive Statistics for Change in NWEA® MAP Reading Assessment scores

	Regression Results				
Variable	*B*	*SE B*	*β*	*t*	*p*
Effectiveness	-1.18	0.86	-.04	-1.36	.17
School	-5.46	1.54	-.17*	-3.55	<.05*
Sex x School	-0.18	1.19	-.01	-.15	.88
Ethnicity x School	0.36	1.34	.01	.27	.79
Spring 16 RIT	0.72	0.02	.80*	30.33	<.05*
R^2		.66			
F for change in R^2		199.62*			

*$p < .05$

In general, students who attended LMM and used the i-Ready Reading Program by CA

demonstrated lower spring 2017 NWEA MAP Reading Assessment scores than students who

attended Scranton and did not use the program by 5.46 points, when holding all other variables

constant. About 2.34% of the change in spring 2017 NWEA MAP Reading Assessment scores

can be attributed to attending LMM and using to the i-Ready Reading Program by CA without

the other predictors removed. About .83% of the change in spring 2017 NWEA MAP Reading

Assessment scores can be attributed to attending LMM and using the i-Ready Reading Program

by Curriculum Associates with the other predictors removed, or exclusively (see Table IV)

Table IV

Correlation Statistics for Change in NWEA® MAP Reading Assessment scores

	Correlations		
Variable	*Zero-order*	*Partial*	*Part*
Effectiveness	.219	-.059	-.035
School	-.152	-.153	-.091*
Sex x School	-.049	-.006	-.004
Ethnicity x School	-.101	.012	.007
Spring 16 RIT	.797	.798	.777*

Question Two: Difference in NWEA® MAP Reading Assessment Scores Based on Ethnicity (Hispanic or Non-Hispanic)

The second research question sought to uncover whether use of the i-Ready Reading Program from CA correlated to a positive effect in student achievement via a change in NWEA® MAP Reading Assessment scores based on the interaction of ethnicity (Hispanic, or non-Hispanic) by school. To determine the effect, a Fixed Effects (FE) Linear Regression model was used. Table III shows the descriptive statistics for the dependent variable NWEA® MAP Reading Assessment Scores. In general, the interaction of ethnicity (Hispanic, or non-Hispanic) by school is not a significant predictor of Spring 2017 NWEA MAP Reading Assessment scores, t (524) = .268, p =.789. .

Question Three: Difference in NWEA® MAP Reading Assessment Scores Based on Sex

The third research question sought to uncover whether use of the i-Ready Reading

Program from CA correlated to a positive effect in student achievement via a change in NWEA®

MAP Reading Assessment scores based on the interaction of sex (male, or female) by school.

Sex refers to biological male or female. To determine the effect, a Fixed Effects (FE) Linear

Regression model was used. Table III shows the descriptive statistics for the dependent variable

NWEA® MAP Reading Assessment Scores. In general, the interaction of sex (male, or female)

by school is not a significant predictor of Spring 2017 NWEA MAP Reading Assessment scores,

t (524) = -.149, p = .882.

Summary

In summary, this quantitative study utilized multiple linear regression analysis to

determine the effect of the i-Ready Reading Program from CA by examining the student scores

on the spring 2017 NWEA MAP Reading Assessment when controlling for prior year reading

scores and teacher quality. Data from LMM and Scranton school in the CMSD were used in the

study. The study consisted of a causal-comparative, ex-post facto design, and contained a

sample size of 530.   The sample was divided into groups of students: those who used the

program, and those who did not. The pre-intervention data consisted of fall 2016 NWEA® MAP

Reading Assessment scores, and the post data consisted of spring 2017 scores.

In general, the variable School was determined to be a significant predictor of Spring

2017 NWEA MAP Reading Assessment scores, $t(524) = -5.225$, $p < .05$. In general, students

who attended LMM and used the i-Ready Reading Program by CA demonstrated lower spring

2017 NWEA MAP Reading Assessment scores by 5.33 points. About 2.34% of the change in

spring 2017 NWEA MAP Reading Assessment scores can be attributed to attending LMM and

using to the i-Ready Reading Program by CA without the other predictors removed. About .83%

of the change in spring 2017 NWEA MAP Reading Assessment scores can be attributed to

attending LMM and using the i-Ready Reading Program by Curriculum Associates with the other predictors removed, or exclusively (see Table IV). In general, the interaction of ethnicity (Hispanic, or non-Hispanic) by school was not a significant predictor of Spring 2017 NWEA MAP Reading Assessment scores at t (524) = .209, p =.835. Finally, in general, the interaction of sex (male, or female) by school was not a significant predictor of Spring 2017 NWEA MAP Reading Assessment scores at t (524) = .779, p = .436.

CHAPTER V

DISCUSSION

Introduction

The Cleveland Plan (CP) was legislation aimed at improving academic achievement for students in the Cleveland Metropolitan School District (CMSD). In the preceding chapters literature pertinent to the CP and school turn-around. Additionally, quantitative data were presented and analyzed. In this final chapter, I will draw conclusions, provide implications for practice, and make recommendations for future research. The final section of this chapter will build upon the topics studied to create a deeper understanding of school level autonomy and student achievement, in addition to an interpretation of the results linked with previous research.

Summary of the Study

The core of the CP was grounded in the idea of autonomy at the building level for school level leaders to make choices with regard to academic programs and materials. The assertion was that in allowing for this autonomy, building level leaders would best be able to know and address the needs of their individual schools. With regard to English Language Arts (ELA), the district did mandate the use of a balanced literacy block for the 2016 – 2017 academic year. This

block included elements of modeled instruction, shared practice, and independent work, which includes digital literacy. Some principals in the CMSD began to exercise their autonomy via the CP and began using the i-Ready Reading Program from Curriculum Associates (CA) to fulfill the digital literacy component. CA states that use of their on-line diagnostic and instruction program closes student skill and knowledge gaps in ELA, hence leading to an increase in student achievement. They conducted and published research on the benefits of the program, however the data collection was based on their own diagnostic and not an outside assessment. In order to determine if use of the program fulfills the intent of the CP, results of reading scores on the Northwest Evaluation Association (NWEA®) Measures of Academic Progress (MAP) Reading Assessment were analyzed between a sample population of students who used the program and those who did not. Schools were matched based on CMSD's peer school model. Also, the independent variables of 2015 – 2016 summative teacher rating, spring 2016 NWEA MAP Reading Assessment scores, sex (male, or female), and ethnicity (Hispanic or Non-Hispanic) were included.

This quantitative study utilized Fixed Effect (FE) multiple linear regression analysis to determine the effect of the i-Ready Reading Program from CA by examining the student scores on the spring 2017 NWEA MAP Reading Assessment when controlling for prior year reading scores and teacher quality. Data from LMM and Scranton school in the CMSD were used in the study. The study consisted of a causal-comparative, ex-post facto design, and contained a sample size of 530. The sample was divided into groups of students who used the program, and those who did not. The pre-intervention data consisted of fall 2016 NWEA® MAP Reading Assessment scores, and the post data consisted of spring 2017 scores.

In general, the variable School was determined to be a significant predictor of Spring

2017 NWEA MAP Reading Assessment scores, t (524) = -5.225, $p < .05$. In general, students

who attended LMM and used the i-Ready Reading Program by CA demonstrated lower spring

2017 NWEA MAP Reading Assessment scores by an average of 5.33 points. About 2.34% of

the change in spring 2017 NWEA MAP Reading Assessment scores can be attributed to

attending LMM and using to the i-Ready Reading Program by CA without the other predictors

removed. About .83% of the change in spring 2017 NWEA MAP Reading Assessment scores

can be attributed to attending LMM and using the i-Ready Reading Program by Curriculum

Associates with the other predictors removed, or exclusively (see Table IV). In general, the

interaction of ethnicity (Hispanic, or non-Hispanic) by school was not a significant predictor of

Spring 2017 NWEA MAP Reading Assessment scores, $t(524) = .209$, $p =.835$. Finally, in

general, the interaction of sex (male, or female) by school was not a significant predictor of

Spring 2017 NWEA MAP Reading Assessment scores, $t(524) = .779$, $p = .436$.

Discussion of the Findings

This study found that there was a correlation between the use of the i-Ready Reading

Program from CA and changes in spring 2017 NWEA MAP Reading Assessment scores. While

there was a correlation, students who used the program actually demonstrated lower spring 2017

NWEA MAP Reading Assessment scores, in general when compared to those who did not.

Also, there was no correlation found in the changes of scores when considering the interaction of

sex (male, or female) by school, and the interaction of ethnicity (Hispanic, or non-Hispanic) by

school.

In attempting to comprehend the dependent variable of spring 2017 NWEA MAP

Reading Assessment scores, the researcher considered the various factors concerned with the

implementation of the i-Ready program. In order to understand this, a brief description of the

program's suggested implementation and functionality will be provided. The i-Ready Reading program uses adaptive technology during its assessment process. When students begin to use the i-Ready Reading program, they are initially administered a diagnostic assessment that levels them. This leveling is aligned to a vertical progression of reading standards from Kindergarten through 12th grade. The results of the adaptive reading diagnostic assessment creates an individualized learning pathway for students aligned to the standard progression. Furthermore, the results of the diagnostic allow for baseline measurement to track student growth against reading standards, and can be used to assist teachers in designing classroom reading instruction. (Curriculum Associates, 2015).

The ability to provide classroom instruction at a student's current level is seen as central to increasing student achievement. While the program provides extensive data reports for teachers, if the diagnostic data is not used to inform classroom instruction, the full benefit of the program will not be realized. It should be noted that research demonstrates how assessment results can be used as a valuable instructional tool for teachers (Veal, 1995). Additionally, the diagnostic administration is quite important to the implementation of the program. Since the diagnostic is adaptive and informs which lessons a student will receive in a sequence, if the diagnostic is not done with fidelity, meaning a student spending the minimum time suggested on the administration, the results of the diagnostic can potentially be seen as not valid.

Furthermore, there are other features of the i-Ready program that contribute to the full instructional supports available. For example, the program provides schools the ability to create standards mastery assessments that match spring state testing assessments, and can be used to inform grade-level classroom instruction. It is through the use of the teaching-learning cycle whereby assessment informs instruction that students are able to receive feedback and teachers

are informed as to what teach next (Wiggins, 1993). One also needs to consider the role of technology in the implementation of on-line supplemental programs. A plan must exist to ensure appropriate access, professional development for students and teachers, and bandwidth capacity at the school level. Other consideration include further development of student voice and choice in the process of selecting, and implementing supplemental on-line programs. Students should have buy-in and be motivated to use the program. Research suggests that student selection and input in language arts instructional practices has a positive effect on students' intrinsic motivation, and in-turn on their reading achievement (Pennington, 2017).

Implication for Practice

This study provided valuable data to advance the conversation on student achievement in the CMSD and the use of supplemental instructional programs. The results of this research point to the need for further research into viable programs at the district level that may in turn be implemented at the building level. Viable programs are those with a research base demonstrating a correlation between use of the program and increased student achievement. Also, considering the financial implications associated with supplemental programs, options which show positive effects should be compiled and considered through an autonomy menu for building level leaders. An autonomy menu refers to a list of program and curricular options that has already been researched and shown to increase student achievement with students in the CMSD. School leaders could then choose programs and curricular options from this autonomy menu. While this will greatly assist with providing materials correlated with higher student achievement, further professional development of building level leaders will need to occur to understand which options to choose, and comprehend the importance of fidelity of implementation. Research supports the idea of professional development for school principals,

and further details that principals need to be seen as the instructional leaders of the school.

Additionally, current research notes the need for their capacity as instructional leaders to be

professionally developed and supported by the central office (Honig, 2012). Furthermore, the

question of teacher and student voice becomes paramount as well when considering

implementation. The district would benefit from an established process that includes these

elements in the building level leaders' decision making process. Specifically considering on-line

and digital tools, both school and district level administrators need to consider the capacity of the

infrastructure in schools to support a high level of use of on-line programs. For example, should

the Wi-Fi capacity be limited, or a school present with limited computers, should on-line

supplemental options even be considered? Essentially, this research study recognizes the impact

of school-level autonomy's role in student achievement with regard to use of the i-Ready

Reading program, and notes that further guidance and consideration must be given to building

level leaders considering the amount of available program options and financial implications.

Recommendations for Further Research

This study looked to address the use of the i-Ready Reading program as it relates to an

increase in student achievement. In considering potential future studies, one could look at how

to create a study to measure the full use of the on-line platform. Much of the data provided via

CA on-line reporting tools specifically look at time spent on task in on-line lessons. They do not

present or consider time used on diagnostics, standards mastery assessments, or a teacher's use

of any downloadable instructional tools or data. Additional research can also be done with

regard to the i-Ready Mathematics program to gauge the correlation the program has on student

scores. Also, CA does have a fully developed K-8 mathematics curriculum and research could

be done on the effectiveness of the on-line math program when used in conjunction with the core mathematics curriculum as a blended learning model.

Specifically looking the results of this study, further research can be done with regard to the within school factors. Students can be clustered into groups by their usage rates into high, medium, and low usage, and analysis conducted to determine if usage within the school has a correlation effect on the change of scores. For this study, the within school factors were not further examined as the research questions posed would not have been answered with this type of analysis. Also, for this particular study ethnicity was examined as Hispanic, or non-Hispanic and found to not be significant, but further research can be done with ethnicity to see if there are significant findings. For example, does the program show positive results specifically for white or black students?

Conclusion

As noted in the opening abstract, student achievement in the CMSD has been consistently poor. The CP is an attempt to address this consistent poor performance, and upholds autonomy as the catalyst for change. This study helps demonstrate that although supplemental instructional programs have a research base, further analysis as to a program's effectiveness are necessary when considering implementation of legislation such as the CP. In considering the i-Ready Reading program, while students who used the program demonstrated lower scores than student who did not, in general, use of the program should still be considered. Consideration should be given to the fact that the data were used based on year one of implementation of the program, and provide merely a one-year snapshot. Furthermore, exploration of growth for students who perform at lower academic levels, and the use of more longitudinal data should be considered prior to a determination to no longer use the program. Beyond the idea of autonomy and

program selection, further dedication at the district level should be paid to current research on school turn-around. Of particular interest is the work being done out of Harvard University's Public Education Leadership Project (PELP). Childress, Elmore, and Grossman (2006) specifically look at the issue of urban school turnaround and note that while things such as autonomy are and can be important, they feel that the effect of the central office is of utmost importance in creating whole system change. While they note that individual schools may have turn-around success, the central office, or district, needs to be viewed as an asset. The central office needs to move towards creating systems that develop leaders, implementing best practices, holding people accountable, developing strategies, and monitoring achievement. This study also supports these assertions as the implications indicate the need for a shift in central office practices as to how the CP is implemented, particularly the elements of autonomy, and the role of the central office in creating systems around this.

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