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iReach Blended Learning Model and Reading Lexile Growth of Freshmen in Maryville City Schools

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by

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ABSTRACT

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The Maryville City School system has implemented the first year of the iReach blended learning model for which all students in the school district have access to either a laptop or an iPad to support their learning every day. The availability of research on the impact of iReach is limited because the blended learning instructional model is relatively new and has not yet been subjected to numerous research studies. The purpose of this ex post facto quasi-experimental quantitative study was to compare student reading Lexile growth data collected through the use of the Reading Comprehension Assessment before and after iReach implementation to determine if there was a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools. Paired-samples *t* test results based on data collected from the 2015-2016 freshman cohort as well as subgroups (males, females, economically disadvantaged, and noneconomically disadvantaged) depict significantly more reading Lexile score growth during the eighth grade year before the school system implemented the iReach blended learning initiative than during the ninth grade, the first full year of iReach implementation. Paired-samples *t* test results based on data collected from the 2015-2016 sophomore cohort to use for comparison to the freshman cohort demonstrated the same significant pattern of growth. These findings suggest that the implementation of iReach is not a sole factor affecting the reading Lexile growth of students. Results from a 2-way contingency table analysis reflect that the freshmen cohort had significantly more students than expected who increased their reading

Lexile scores from eighth grade pretest to ninth grade posttest than the expected frequency of students in the sophomore cohort who increased their scores. These significant findings indicate that either the implementation of iReach, another variable, or a combination of variables worked better for the freshman cohort and attributed to the higher than expected frequency of students whose scores increased.

DEDICATION

To Gene M. Moody. Thank you for encouraging your little granddaughter, the teacher, to get her doctorate and for inspiring in her a thirsty soul for the cool water of life. My dear sweet papaw, I'll meet you on the other side of the river.

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INTRODUCTION

The Maryville City School district in Maryville, Tennessee, is implementing a blended learning initiative called iReach with emphasis on the iReach mission "to infuse technology and shift instructional practices in ways that create limitless learning opportunities for all twenty-first century learners in the Maryville City Schools" (MCS). As of the 2015-2016 school year, each student in grades Kindergarten through 4 has received a district issued iPad, and each student in grades 5 through 12 has received a district issued laptop. Teachers in the district are receiving professional development to strengthen their use of instructional technology to support student learning. Ex post facto quasi-experimental quantitative methodology with secondary data analysis (McMillan & Schumacher, 2010) was used to study Reading Comprehension Assessment Lexile scores collected from the 2015-2016 cohorts of freshman and sophomore students in Maryville City Schools to measure reading Lexile growth prior to and during the first year of implementation of the iReach blended learning model to determine if there was a correlation between the implementation of iReach and reading Lexile.

Purpose

The iReach conversion in Maryville City Schools requires a pedagogical paradigm shift with regard to methods for both standards-based instruction and student engagement (MCS). The reading Lexile data of eighth and ninth grade students is collected as these students pass through Maryville Junior High School to monitor literacy growth and achievement. The instructional methodology changes occurring during the implementation of this blended learning model in

Maryville City Schools may affect student literacy skills acquisition. The purpose of this ex post facto quasi-experimental quantitative study was to compare student reading Lexile growth data collected through the use of the Reading Comprehension Assessment before and after iReach implementation to determine if there was a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools.

Research Questions

The following research questions examine the differences that exist in reading Lexile growth of the study participants and the number of participants who achieved reading Lexile growth as they passed through eighth and ninth grades in Maryville City Schools.

Research Question 1

Is there a significant difference between the reading Lexile growth scores of eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2015-2016 school year?

Research Question 2

Is there a significant difference between the reading Lexile growth scores of male eighth grade students during the 2014-2015 school year and the growth scores of male students of the same cohort of ninth grade students during the 2015-2016 school year?

Research Question 3

Is there a significant difference between the reading Lexile growth scores of female eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of female students of the same cohort of ninth grade students during the 2015-2016 school year?

Research Question 4

Is there a significant difference between the reading Lexile growth scores of economically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of economically disadvantaged ninth grade students of the same cohort during the 2015-2016 school year?

Research Question 5

Is there a significant difference between the reading Lexile growth scores of noneconomically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of noneconomically disadvantaged ninth grade students of the same cohort during the 2015-2016 school year?

Research Question 6

Is there a significant difference between the reading Lexile growth scores of eighth grade students during the 2013-2014 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2014-2015 school year?

Research Question 7

Is there a significant difference between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort?

Research Question 8

Is there a significant difference between the rates of eighth to ninth grade reading Lexile growth of the freshman and sophomore cohorts?

Significance

Variations of blended learning exist, and blended learning models are used by many school districts throughout Tennessee and the United States. Researchers are finding that blended learning models are most effective in supporting student learning when technology use is streamlined as part of the typical school day in combination with teachers who are supported by school leadership and well prepared to implement instructional technology (Gielniek, Greaves, Hayes, Peterson, & Wilson, 2012). The Maryville City School district in Maryville, Tennessee, has developed its iReach blended learning model, in part, based on this premise. This study serves as one guidepost for Maryville City Schools in the initial stage of change, providing an indicator of a potential relationship between the implementation of the iReach blended learning instructional model and student literacy skills acquisition in the district (Wiggins & McTighe, 2007).

Definitions of Terms

The following key terms are essential to this study:

1. *Blended Learning* is defined in three parts by Horn and Staker (2015), who explained, "First, blended learning is any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace." Second, "the student learns at least in part in a supervised brick-and-mortar location away from home." Third, "the modalities along each student's learning path within a course or subject are connected to provide an integrated learning experience" (p. 34). Additionally, in an *Evaluation of Evidence-Based Practices in Online Learning*, the United States Department of Education (2010) described blended learning as a mixture of online and offline learning with both face-to-face and independent learning conditions.
2. *Common Core* encompasses learning goals for mathematics and English Language Arts (ELA) that outline knowledge and skillsets that students should have when they complete each grade level to ensure that Tennessee high school graduates advance to postsecondary college and career opportunities with skills for success no matter where they are from or where they choose to live. (CCSSI). Tennessee State Standards are based on Common Core State Standards and feedback from educators and community stakeholders.
3. *Computer Adaptive Test* refers to an assessment that asks questions that progressively adapt in level based on how the participant responds to each question so that each participant taking the assessment could take a personalized version with intentions to

better assess the learning abilities or needs of each student. The Reading Comprehension Assessment is a computer adaptive test (Scholastic, 2014).

4. *Criterion-referenced tests* reflect student achievement in relation to learning standards and make it possible for any combination of participants to score the same because participants are not compared to each other. Participants are only compared to designated standards (NSBA, 2006). The Reading Comprehension Assessment is a criterion-referenced test used to measure achievement in reading, and it generates reading Lexile scores for individual students that align with a common scale of measurement that can be used to monitor student reading Lexile growth over a designated period of time (Scholastic, n.d.). According to *The Reading Inventory Technical Guide*, The Reading Comprehension Assessment converts raw scores to corresponding Lexile scores. Therefore, the same Lexile metric that is used to measure texts is also used to measure readers so that readers and texts can be aligned using the same measurement metric within the Lexile Framework (Scholastic, 2014).
5. *Device* is defined by Maryville City Schools (2015) in its *iReach Resource Guide* as a tablet or a laptop.
6. *Hot spots* are mobile devices that can be used as wireless access points so that users will have Internet access. The Blount County Public Library has a Hot Spots for Rent program for Maryville City School students and Blount County residents who need Internet access at home or on trips (BCFOL, 2016).
7. *Internet* refers to an international network of signals linking computers systems for which users need an Internet service provider to gain access. If Internet users attempt to connect

to the Internet via a public or private Wi-Fi signal, the Wi-Fi router must be connected to an ISP (“Internet,” 2016).

8. *Internet Connectivity* refers to methods in which the Internet can be accessed and the quality of Internet access. For example, some ways that the Internet can be accessed are via home broadband access, a mobile data plan, or Wi-Fi-enabled devices (Kratz & Rideout, 2016).
9. *iReach* is defined by Maryville City Schools (2015) in its *iReach Resource Guide* as the “one-to-one digital conversion” of Maryville City Schools, for which all students have received district-issued devices to use for educational purposes in compliance with district responsible use policies. (p. 2).
10. *Lexiles* are derived from the Lexile Framework for Reading, which provides a scale that educators can use to measure a student's reading ability and to measure the text complexity of materials that students read (MetaMetrics, 2016c). Lexile measures are distributed on an equal-interval scale and can be used for mathematical calculations requiring equal-interval units. Lexile measures are not based on norming groups. Therefore, students are not automatically compared to the progress of grade level peers. Comparing students to peers can be harmful to self-esteem and impede future growth. Comparing students to equal-interval Lexile measures helps to pair them with texts and instructional strategies to meet their developmental literacy needs (MetaMetrics, 2016a). According to MetaMetrics, Lexile measures do not directly correspond with specific grade levels but are better used to monitor student growth and adjust instruction to provide instruction that is conducive to student reading skills development according to student’s level of reading ability (MetaMetrics, 2016b).

11. *One-to-one Computing* occurs when a school or district has a ration of one device per student so that every student has a computer or tablet to use as a learning tool (Project Red).

12. *Reading Comprehension Assessment*, formerly known as the Scholastic Reading Inventory, refers to an assessment that converts raw scores to corresponding Lexile measures so that the same Lexile metric that is used to measure texts is also used to measure readers so that readers and texts can be aligned using the same measurement metric within the Lexile Framework (Scholastic, 2014). The Reading Comprehension Assessment is a computer adaptive assessment that generates reading Lexile scores for individual students by providing a series of questions that adapt to a participant's reading level based on the responses received for each question. This assessment is a pedagogical tool with its use for selecting appropriate texts for students, and it is a data analysis tool in its use for progress monitoring. (Scholastic, n.d.).

13. *Technology, pedagogy, and content knowledge (TPACK)* is a framework for effectively supporting student learning when using technology (Koehler & Mishra, 2009). The craft of teaching is complex and requires teachers to be willing to adapt to constant change, accessing and integrating various domains of knowledge, "including knowledge of student thinking and learning, knowledge of subject matter, and increasingly, knowledge of technology" (p. 61). Koehler and Mishra (2009) emphasize that classroom instruction and student learning involve dynamic phenomena. Therefore, school leaders should provide professional development for teachers in the areas highlighted by the TPACK Framework. In turn, teachers need time conscientiously strive to develop their acumen

with regard to areas of the TPACK Framework (Chewning, 2015; Gielniek et al., 2012; Koehler & Mishra, 2009).

14. *Wi-Fi* is a tool for connecting devices to other devices using a wireless networking signal. It is the standard method of connecting computers to the Internet and other wireless networks ("Wi-Fi," 2016). When a device connects via Wi-Fi to a router with an Internet connection, users can access the Internet. However, if the Wi-Fi enabled device is not connected to a router with an Internet connection, users will not be able to access the Internet.

Delimitations and Limitations

This study contains various limitations typical of educational research. Knowledge gained from and conclusions based on educational research are limited because of the nature of the field of education. According to McMillan and Schumacher (2010) the nature of education is complex and oft changing concerning numerous exchanges among community and government organizations such that the complexities of teaching and learning are compounded and evolving as well. These intricacies of the processes and institutions involved in the American education system limit the scope of structured research that can be conducted in the field of education. Research methods are generally limited due to these systemic complexities in addition to concerns in research ethics, inconsistency in educational programs, diverse populations, and complications in methodology. Program variability is instrumental in affecting the course of educational research because variations of similar programs exist, and various programs are often introduced and implemented simultaneously. Even during national reform efforts local politics can affect implementation of school programs. For example, perceptions of high-stakes testing and accountability systems can influence evaluations of curriculum reform efforts. In the case of MCS within the state of Tennessee, the Tennessee Department of Education (n.d.) has recently implemented both a shift in curriculum standards and in methods of standardized testing that are still in a state of flux as state political and education leaders work to troubleshoot ideological and technical concerns in response to these changes. In turn, all of these changes affect MCS teachers, students, and the learning process during the implementation of iReach.

Another notable limitation of this study is that students have been taught by a variety of eighth grade and ninth grade teachers. Exposure to diverse instructional strategies could contribute to differences in growth among students. In addition to having different teachers, students' teachers implement various types of technology tools, and throughout the MCS iReach conversion, the individual teachers are learning and implementing new technology practices into their pedagogical styles. As teachers work to enhance instruction via use of technology, they are in the process of determining what best practices are in instructional technology use within the realm of blended learning because at this phase for both MCS and districts across the nation there is no prescribed blended learning methodology. As the district is in the early phase of iReach implementation, the district could experience an implementation dip as teachers and students acclimate to their new learning environment and resources (Fullan, 2001).

MCS acknowledges that the iReach digital conversion requires a shift in pedagogy while acquiring and developing new, engaging uses for 21st century technologies to prepare students with real-world industry, business, and academic skills (Maryville City Schools, n.d.). MCS teachers plan instruction in alignment with Tennessee State Standards and TPACK blended instruction philosophies (Maryville City Schools, 2015), and they use Blackboard as a learning management system (LMS) for organizing course content and communication with students and parents. MCS also emphasizes that teachers need technical and instructional support to successfully accomplish the mission of the iReach digital conversion (Maryville City Schools, n.d.). Therefore, each school has a technology coordinator for onsite technology assistance, and early adopter teachers from the first implementation phase assist other teachers as needed. Teachers who have novel ideas lead district professional development opportunities for teachers and administrators to spread ideas and best practices. Teachers collaborate during daily planning periods to better integrate technology into lessons in ways that strengthen student learning. District administrators emphasize the use of TPACK in instructional planning and advocate teacher reflection on personal acumen with regard to areas of TPACK. According to the district Instructional Implementation Plan teachers who effectively implement instructional technology to support student learning are willing to engage in and provide continuous professional development to better prepare themselves to facilitate student growth and preparedness for college and career, and the iReach blended learning model contributes to the MCS reputation for academic excellence (Maryville City Schools, 2015).

Notable also is that some MCS teachers were early adopters of devices during the 2014-2015 school year before the full implementation of the one-to-one computing phase of iReach during the 2015-2016 school year. The purpose of the early adopter phase was to help the district troubleshoot and plan for infrastructure and policy needs that could affect the full implementation of the iReach initiative. Therefore, 2015-2016 cohort of ninth grade students had access to laptops during their eighth grade English classes on days when their English teachers had planned lessons using the laptops during the school day. However, during their eighth grade school year these students did not have access to the laptops in other classes, they did not use the laptops in English class on a daily basis, they were not assigned devices for personal use, nor were they able to take the laptops home. Therefore, they were not able to experience the full impact of blended learning in all curriculum content areas during the school day or after school hours. However, when comparing eighth and ninth grade Lexile growth of this cohort of students to eighth and ninth grade Lexile growth of the 2014-2015 cohort of ninth grade students, it is possible that results could differ because the 2015-2016 cohort of ninth graders had access to laptops during English class during eighth grade when the 2014-2015 cohort of ninth grade students did not have access to laptops during English class during eighth grade.

In addition to variation in instructional strategies and use of technology prior to and during full iReach blended learning implementation, another factor that could affect educational outcomes for MCS students is that teachers are working to prepare students for a shift in statewide assessment. The implementation of iReach also occurred simultaneously with the implementation of the TNReady assessment system for Tennessee schools during the 2015-2016 school year. Because of the transition from the former Tennessee Comprehensive Assessment Program (TCAP) to TNReady, comparative assessment data from the state level are not available for students participating in the first year of iReach. However, local assessment data are available for comparative research, including the Reading Comprehension Assessment data analyzed for this study. The iReach model affects all students and curriculum content areas as students are expected to access technology tools for digital reading and writing experiences in every content area. Because literacy and technology skills are reinforced in all content areas, the Reading Comprehension Assessment achievement data can serve as one district-wide indicator of student progress in grades 8 and 9 as the district undergoes changes related to iReach.

Another limitation of this study, in addition to factors related to instruction and assessment, is the adolescent period of maturation of the study population. These eighth and ninth graders are in a period of early adolescence and are undergoing rapid psychological and physical changes that could contribute to the rate and quality of their learning processes (Ryan, Shim, & Makara, 2013). As adolescents enter and progress through middle grades, they experience extensive social, emotional, and academic changes in conjunction with more rigorous academic expectations. As they progress from the oldest of their elementary school peers to the youngest of their middle school peers, students must construct new social circles and adapt to diverse instructional styles while engaging in a rotating class schedule with multiple teachers throughout the school day. Unfortunately, the demands of these changes can be difficult for adolescents to process. The context of middle grades is at odds with the natural psychological needs of early adolescents, and this experience can cause instability that is uncomfortable and confusing. Students transitioning from elementary to middle school tend to gain self-esteem through their relationships with teachers and peers, but they tend to experience regression in academic stability during this period of adolescence. These factors concerning adolescent development could influence learning outcomes for students in this study.

There are other factors that could contribute to decreases or increases in student achievement, such as students' attitudes and behavior (Lee, 2014). Attitudinal factors could include attitudes toward reading, school, teachers, or peers. Behavioral factors could include whether a student reads diverse texts, reads online, or has essential metacognitive abilities such as summarizing, comprehension, or use of control strategies. Student and parent socioeconomic and cultural demographic factors can also contribute to decreases or increases in student achievement. These factors can be unavoidable for students and a challenge to control for when conducting research, but it is critical to acknowledge that any combination of such factors also impacts student learning and growth and that each cohort of students may have a different distribution of such factors affecting educational outcomes for students in each cohort.

In addition to these delimitations and limitations, one significant disclosure for this study is that as the researcher I also teach at Maryville Junior High School. Although I have neither taught the population of students in this study nor collected the initial student data from this population, I have led professional development and iReachU training sessions for faculty at Maryville Junior High School and the MCS district that may have instructional practices experienced by the 2015-2016 cohort of ninth grade students during their ninth grade school year.

Chapter Summary

The iReach initiative is a blended learning model implemented by Maryville City Schools for which all students experience a blend of one-to-one computing in concert with face-to-face instruction. The purpose of this ex post facto quasi-experimental quantitative study was to study Reading Comprehension Assessment Lexile scores collected from the 2015-2016 cohort of ninth grade students in Maryville City Schools to measure reading Lexile growth one year prior to and during the first year of the full implementation of the iReach blended learning model and also to determine if there is a significant difference between Lexile growth scores before and after implementation of iReach. This could aid in determining if there is a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools.

However, due to the complex nature of the field of education and educational research design, a variety of limitations of this study exist. These limitations include that the study population has been taught by different teachers, MCS teachers are learning and implementing new technology practices into their pedagogical styles, there is no prescribed blended learning methodology, some MCS teachers were early adopters of devices during the 2014-2015 school year before the full implementation of the one-to-one computing phase of iReach during the 2015-2016 school year, the initial implementation of iReach has occurred simultaneously with the implementation of the TNReady assessment system for Tennessee schools during the 2015-2016 school year, and the adolescent period of development and maturation of the junior high level students making up the population for this research. Additionally, one significant disclosure I am compelled to make regarding this study is that I am a teacher at Maryville Junior High School and have led faculty professional development and iReachU training sessions for faculty at Maryville Junior High School and the MCS district that may have impacted instructional practices of teachers of the 2015-2016 cohort of ninth grade students during their ninth grade school year.

CHAPTER 2

REVIEW OF LITERATURE

Federal, state, and local mandates foster pervasive and strategic use of technology to support student learning throughout the United States. As technology has changed and evolved over the last few decades, American leaders have recognized the potential for national growth as citizens take hold of technology tools and begin to use them in novel and practical ways that benefit society. The Technology Literacy Challenge was introduced by President Bill Clinton in 1996 as an impetus to provide access to educational technology such as computers, the Internet, and digital instructional resources for all American students (Hoyer, 2011). In 2004 President George W. Bush acknowledged the educational benefits of broadband technology and a need for Americans to have access to it. In a speech to the U.S. Department of Commerce Bush advocated for stronger national broadband infrastructure to support high quality broadband access including access to wireless broadband technologies like Wi-Fi access points and mobile wireless telecommunications technology throughout the United States for access by all Americans. President Bush emphasized that broadband would be beneficial to national industry and improve the life of American citizens. President Bush reported that the spread of broadband access throughout America has been on the rise with subscriptions increasing from approximately 7 million lines in 2000 to approximately 28 million lines in 2003. President Barack Obama has also voiced concern for this cause with special regard to education. In his 2015 State of the Union Address, President Obama expressed his intent to ensure open access to the Internet and to spread access to the Internet to all communities, schools, and classrooms across the nation so that all citizens would have fast, reliable Internet access and equal opportunities to innovate and build career skills that could redesign the world as we know it (White House, 2015). One of Obama's education goals is to ensure that 99% of students in American K-12 schools connected to the Internet by 2018 (Basu, 2015). As of 2013, the population of American school districts that met the Federal Communications Commission's (FCC) minimum goal for Internet access was a sparse 30% of districts across the nation, but as of 2015, this population increased to 77% of school districts, which represented 53% of American students (Camera, 2015). Today more American students and their families have access to computers and the Internet than ever before.

In American schools with high-quality technology infrastructure many teachers and students are becoming more accustomed to technology use for instructional purposes. Horn and Staker (2011) confirmed that online learning is far reaching throughout the nation. As of 2000 approximately 45,000 students in K-12 schools were reported to have taken an online course, and that population exceeded 3 million students by 2009. Most online learning environments consist of blended learning in which students use technology under supervision of adults. In 2010 the United States Department of Education [U.S.D.O.E.], taking note of rapid changes in instructional technology use, published a meta-analysis of research literature regarding online learning between January 1996 and July 2008. Analysts reported that there were few formal, published studies that compared online and face-to-face learning conditions for primary and secondary school students. Because limited research existed at the time of the meta-analysis, the literature review included both research literature on K-12 education and literature involving online learning in other contexts outside of the K-12 setting, such as post-secondary college, career, corporate, and military training settings. Therefore, U.S.D.O.E. analysts recommended further research on online learning in K-12 settings and disclosed that, although the findings had implications for K-12 learning, the findings may not all apply to the K-12 population due to the inherent developmental differences of the K-12 and post-secondary populations. Fortunately, since the 2010 publication of this U.S.D.O.E. meta-analysis, myriad studies have been unfolding regarding online learning. However, many studies have been completed during the initial stages of technology implementation within school districts, so researchers are adding to this body of literature every year as school districts continue their instructional use of technology and online learning.

Key findings from this U.S.D.O.E. (2010) meta-analysis were that students who experienced online learning demonstrated somewhat higher levels of performance than students who primarily experienced face-to-face instruction, and the gap between student outcomes for these two comparison groups was more pronounced in the results of studies for which the conditions compared were blended learning environments and purely face-to-face instructional environments such that students who experienced a mix of online and traditional, face-to-face instruction tended to perform much better than those who experienced face-to-face instruction only. This phenomenon suggests that blended learning can be more effective than either online learning or face-to-face instruction alone. Analysts also acknowledged that students who experienced blended learning often received more learning time and more instructional tools than students who received face-to-face instruction only, which suggests that the positive results of blended learning can be attributed to a variety of instructional and situational factors rather than the use of technology alone. In other words, findings of the meta-analysis did not implicate that sending students to work online alone would be beneficial but that the use of instructional technology to provide added support and additional learning opportunities for students is beneficial. When students can access new information online, have some control over the pace and path of their learning, and receive the added benefits of accessible mentorship from a high quality educator, they have more tools to succeed in their educational endeavors. The researchers noted that there were few rigorous studies of K-12 environments, and the findings are not necessarily generalizable to K-12 settings.

With the rise in instructional technology use, Horn and Staker (2011) contended that the American education system could be transformed by online learning if online learning is used to personalize and enrich student learning experiences. To capitalize on this potential offered by the use of instructional technology, according to the Office of Educational Technology, the National Education Technology Plan outlines a guide for revolutionizing teaching and learning to be supported through Title IV A of the Every Student Succeeds Act (ESSA), which was signed into law by President Barack Obama on December 10, 2015 (U.S.D.O.E., 2016). The goal of ESSA with regard to technology is that American students “must have the same competitive advantages as students in other countries. Teachers and leaders in all of America’s schools need the support and professional development to select and use technology to improve student outcomes” (U.S.D.O.E., n.d. a) In a progress report on ESSA Tennessee is recognized among four states that are leaders in supporting positive change for students and teachers that elicit significant growth in student learning and achievement (U.S.D.O.E., n.d.). As such, the state of Tennessee has been working to support curriculum expectations, college and career readiness goals, and technology infrastructure for students and teachers throughout the state.

At the state level Tennessee adopted new standards for math and English language arts in 2010 as part of its commitment to prepare high school graduates for college and career aspirations and to promote a shift in recognized best practices for teacher pedagogy (T.D.O.E., n.d.). Since then school districts across Tennessee have responded by using professional development for teachers and administrators to prepare for implementation of the newly adopted state standards and in enhanced local efforts to prepare students for college or the workforce. At the local level, some Tennessee school districts are implementing blended learning instructional models in conjunction with the new state standards in unified efforts to improve outcomes for Tennessee students.

Blended Learning Models

Blended learning is not the same as online learning, nor is it the same as simply teaching with technology. Blended learning is defined in three parts by Horn and Staker (2015), who explained, "First, blended learning is any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace." Second, "the student learns at least in part in a supervised brick-and-mortar location away from home." Third, "the modalities along each student's learning path within a course or subject are connected to provide an integrated learning experience" (p. 34). Many variations of blended learning exist, but this comprehensive definition includes common threads shared by all blended learning models. However, Wills (2015) predicted that in the near future what we now consider to be blended learning will simply be called learning.

Blended learning models are diverse and unique among each school system and even among schools within system-wide implementations of one-to-one technology initiatives. At this point teachers are experimenting with a variety of software and hardware tools in combination with varied instructional strategies as they work to implement blended learning with their students, so a recognized compendium of best practices in any given content area has yet to be established. Han, Wang, and Yang (2015) described blended learning as a complex system with various subsystems and teams of participants who interact and self-organize in dynamic ways to adapt to change and develop in ways that support enhanced learning. Essentially, blended learning models that succeed in positive learning outcomes for students are systems that are coevolving and dynamic such that systemic change occurs in response to the needs of learners in an environment in which a variety of tools are available, in which new and varied learning behaviors are possible, and in which new and varied instructional skills and tools are supported. School districts that implement blended learning successfully enter into the journey with a planned framework, but one that allows flexibility for instructional change and growth.

Many school districts seek out blended learning because they are ready for change, and blended learning models are used by many school districts as a solution to current economic and social crises that exist in modern society. Proponents of blended learning agree that America is in need of dramatic institutional change for its education system to make schools more efficient and effective at eliciting more positive learning outcomes for students. Importantly, there is more to schooling than teaching kids to retain more facts. Instead, students need to hone metacognitive skills needed for learning and understanding new information and skills to equip them to be more competitive in a global marketplace (Gielniek et al., 2012; Wilson, 2012). Arnett (2014) further illustrated this shift in demands for how and why students learn in contending that our modern, global economy requires workers who are proficient in a knowledge-based skillset rather than industrial era skills. Modern workers need higher-order thinking and problem solving skills, creativity, social awareness, and the ability to collaborate. Alongside this shift in skills preparation, effective implementation of blended learning also provides the ability for teachers to differentiate instruction to meet students' diverse learning needs (Arnett, 2014; Myer, 2016; Tucker, 2016). Such customization has also been reported as successful when used by schools implementing blended learning for differentiation in support of students taking part in credit recovery programs (Kleber, 2015).

Project RED researchers (2012) provided a guide for school reform that emphasizes streamlining technology into the learning environment with instruction led by teachers who are trained and supported. Research indicates that best results of blended learning occur when the student-computer ratio is one-to-one, when teachers are trained to effectively implement instructional technology to support student learning, and when school leaders support technology integration (Gielniek et al., 2012). Project RED researchers (2012) report that one-to-one technology initiatives can boost student achievement, generate cost savings for school systems, and positively impact school climate. However, the effect of such a technology initiative on student achievement depends on the quality of implementation.

Hein (2013) found similar results when she conducted a quantitative study regarding the effects of blended learning and traditional learning on student achievement and student interest. With regard to student achievement, Hein collected sixth grade math scores from the Delaware Comprehensive Assessment (DCAS) for students in a middle school in southern Delaware. Based on her analysis of these data, Hein concluded that blended learning did not significantly affect achievement or interest. Hein noted that although there is much contemporary literature about the effects of technology use and blended learning, a limited body of research on the effects of blended learning on either achievement or interest. Hein encouraged decision-making stakeholders to weigh the costs and benefits of implementing blended learning before making commitments to implement blended learning models because, essentially, the use of blended learning is not the key in boosting student interest or achievement. School districts must determine which tools and strategies work best for them.

In a case study of students in a large high school in Southwest Missouri, Ramsdell (2014) found that, on seven out of eight End-of-Course exams, student achievement increased after the implementation of a one-to-one blended learning initiative and that the teachers in the school exhibited an unexpected desire for professional development in the use of instructional knowledge to support their students' learning. Ramsdell's research suggested that, when teachers take an active role interest in the one-to-one implementation and have positive perceptions of the impact of one-to-one technology use in their schools, they may be more likely to support their students in making gains achievement.

Based on a meta-analysis comparing achievement scores of high school students "during a traditional teaching period" and a "laptop teaching period" Dennis (2014) affirmed Hein's (2013) findings, concluding that blended learning does not directly result in improved student achievement (p. 75). Dennis also emphasized that quality control and teacher preparation are essential eliciting student academic growth during an implementation of blended learning. Dennis (2014) also recommended following Project RED guidelines in deciding whether or not to implement a blended learning model and considering outcomes of other school districts that have attempted to implement such programs. Hein (2013) also recommended that further research be conducted at various grade levels and curriculum content areas. Contemporary research also indicates that monitoring of student achievement and other indicators is essential to the implementation process so that school leaders can adjust practices as needed to ensure that the delivery of the one-to-one technology initiative elicits results in alignment with the mission and vision set forth at the beginning of the initiative (Alijani, Kwun, & Yu, 2014; Gielneck et al., 2012; Hein, 2013).

Access

Instructional technology tools and infrastructure are rapidly changing throughout America. The technology tools are becoming increasingly advanced, and the amount of funding spent on technology tools is rising. According to the Educational Technology Fast Facts provided by the National Center for Education Statistics (U.S.D.O.E., n.d. b), approximately 97% of teachers had one or more computers in their classrooms in 2009, approximately 54% of teachers had computers to bring into their classrooms, Internet access was available for approximately 93%-96 % of computers in classrooms, and less than 50% of teachers self reported that their students were sometimes or often using computers to support student learning in the classroom. Indicators of change in perspective on the significance of instructional technology usage are the United States public school expenditure of approximately $3 billion or more on technology content (Harold, 2016) and that many school districts across the nation are currently implementing or in planning stages to implement one-to-one technology initiatives.

Digital Divide

One of the many benefits of delivering a one-to-one technology initiative is that putting a device in the hands of each student is a step toward bridging the digital divide, leveling the playing field for students of diverse socioeconomic status (SES) and backgrounds (Harris, 2010). Kratz and Rideout (2016) surveyed 1,191 parents with low to middle socioeconomic status with children ages 6-13 with a focus on Internet access. Kratz and Rideout emphasize that Internet connectivity has become an essential component of daily life because it is a resource helpful in completing important day-to-day tasks that have primarily become online tasks rather than face-to-face tasks. For families that have children in school this reality is amplified because technology tools have become integral school supplies. From checking students' grades to doing digital research to creating electronic documents for homework, students have many academic needs for technology. Parents who cannot access online banking, online bill payment, email correspondence for personal or professional use, digital job applications, or digital college applications are at a certain disadvantage in today's technology-centric culture.

Davis (2009) described cultural changes of the digital age that must be considered when working to bridge the digital divide. The transition from the industrial era to the age of information is also known as the digital age. The amount of information that can be accessed at any given time is now compounding at an exponential rate. Smart technologies are continually being created and developed in the forms of phones, cars, appliances, and other tools while people are met with decisions to either use technology or lose services in various day-to-day circumstances such as receiving messages via voicemail or email. People are now connecting with individuals and organizations as never before. Perceptions of the time and location parameters of the modern workplace have been dramatically altered by technological capabilities that allow people to work anytime, anywhere.

Because technology and Internet access are integral parts of modern life, families who have unequal access to technology and Internet connectivity are also subject to both educational inequality and economic inequality (Davis, 2009). It is important to understand the potential benefits of expanding technology access for all as well as the risks for those who do not have access. Understanding how families are affected by digital inequality provides both an impetus for school districts to solve the problems that contribute to digital inequality and a roadmap to specific areas of need that indicate where and how school districts can concentrate resources to provide equal access to technology and Internet connectivity (Davis, 2009; Kratz & Rideout, 2016; Lloyd, 2012).

Quality of Access. Having Internet connectivity on a cell phone or mobile device is not the same as having Internet connectivity on a desktop or laptop computer because cell phones and mobile devices often have limited functionality in a variety of areas such as viewing webpages, word processing, and the use of common computer applications. Some families have Internet access at home via a cell phone or tablet rather than a home computer. However, the quality of access these students have is not equal to the quality of access for students with home computers (Selyukh, 2016). According to Kratz and Rideout (2016) students who have neither devices nor connectivity are at an extreme disadvantage because they have a lack of resources and opportunities. However, students and their families who have limited access to the Internet at home are also disadvantaged because their devices are not fully functional and do not allow them to take advantage of the same types of opportunities as families who have high quality Internet connectivity on home computers. For example, many companies have web-based job applications, many banks and lenders have online bill pay services and offer discounts for electronic statements and bill pay, and colleges often communicate with students primarily via electronic correspondence. These technology disadvantages can lead to economic disadvantages and inequality as well because families without technology or with low quality connectivity do not have equal access to these opportunities.

Currently, one quarter of American families who are economically disadvantaged and have school-age children only have access to the Internet via a cell phone or mobile device (Selyukh, 2016). This number is one third of American families for those whose income falls below the national poverty line, which means that students who are economically disadvantaged spend less time using the Internet and less time using technology at home and may be less likely to arrive at school with tech savvy skills as students who have experience with home computers and high quality Internet access. Selyukh highlighted that having no home Internet access or mobile-only access can make it difficult for students to develop skills, hobbies, or personal interests through personal research or practice supported by technology. This scenario could prevent a student from realizing potential in a specific area of interest, such as art, music, coding, or other skill set. With regard to completing homework for school, the sizes of the mobile device screen and keypad can become impediments to learning. Additionally, without a home Wi-Fi plan a family would to need rely on a data plan from a cell phone company, which may have caps on data usage or place a financial strain on a struggling family. To achieve digital equity in America, the sole problem is no longer whether or not people have home computers but that people have limited access to the Internet (Selyukh, 2016).

One type of blended learning implementation in American school districts has been the Bring-Your-Own-Device (B.Y.O.D.) initiative. This is a common startup phase for districts in initial stages of planning for a one-to-one computing startup but that have not yet prepared to fund the full initiative. The issue with B.Y.O.D. is that not every student has a device, and of students who can bring devices to school, not every student has a high quality device or devices that have the same capabilities. This type of scenario obviously exacerbates the SES digital divide, and creates an instructional materials planning conundrum for teachers. With regard to quality of access school districts that implement one-to-one blended learning models in which each student and teacher has the same type of device helps to resolve these types of issues with devices. The matter of device connectivity, on the other hand, is a wider concern because connectivity involves having a connection available on school campuses but then also at students homes within the surrounding community. Community partnerships often emerge to assist in these endeavors. For example, local government may provide connectivity assistance for students living in low-income housing, and libraries, businesses, and community organizations often offer free Wi-Fi to community members (Selyukh, 2016).

Socioeconomic Factors. Socioeconomic factors affecting students' access to digital technology and the Internet affect student learning experiences (Harris, 2010; Ituah, 2013; Kay, Russell, Bebell, & Peck, 2010; Kratz & Rideout, 2016; Nelson, 2011; Weber, 2012). Although many economically disadvantages families have a way to communicate electronically, one-in-five connect to the Internet primarily via a mobile device (Kratz & Rideout, 2016). One-to-one laptop initiatives help level the playing field for low SES students and their families so that having basic technology skills, digital resources, and connectedness provide more equalized educational opportunities (Harris, 2010). In a study of a sample of schools in Massachusetts researchers (Kay et al., 2010) found the use of laptops to support student learning reduced the effects of socioeconomic factors on English Language Arts (ELA) achievement when compared with groups of students in schools that did not provide laptops to students; in fact, the data from this study reflected that socioeconomic status was not a barrier at all in the laptop schools. Removing an economic barrier by ensuring that all students have the same baseline tools can give every student a chance to access skills and information they need to be successful.

Digital Use Divide. In addition to the commonly recognized SES digital divide that exists in America, Talley et al. (2012) contended that more divides exist in addition to the digital divide in the how many people actually have access to technology devices. According to Talley et al. in addition to access to devices, leaders of school improvement should strive to develop technology interventions that account for needs that arise in response to the "social context of its students and their communities" because ensuring all students in a diverse population have quality access to technology and use it in ways that support learning, schools can enrich student learning environments and elicit positive outcomes in student growth and achievement. In a study concerning the effects computer and Internet access in student homes on achievement gaps in literacy and numeracy for economically disadvantaged students and noneconomically disadvantaged students, research of Vigdor and Ladd (2010) supports the conclusion of Talley et al. (2012) about the importance of meaningful use of technology because they concluded that giving students access to computers at home was not the sole factor for students increased achievement in reading or math and that student achievement levels most likely depended on a combination of variables such as the purpose of a student's use of technology and time spent with technology for educational purposes. Parents also need training in technology use and how to support their children's academic success with technology as a tool for education (Harris, 2013).

If technology is used primarily for basic entertainment or communication purposes, it is not being efficiently used to achieve academic objectives. In fact, the National Education Technology Plan (2016) warned that simply having computers and Internet access does not ensure that students will engage in quality learning experiences or make meaningful gains in achievement. School districts must plan methods of providing meaningful guidance and intervention with regard to how students are using technology so that they use it in ways that support their academic and personal growth. If not, the digital use divide will continue to grow (p.18). As evidence of the problem of inexperience with technology or of unproductive technology use in general, NPR Learning & Tech correspondent Gabrielle Emanuel (2016) reported that, based on results that compared statistics from America and other countries in the Organization for Economic Co-operation and Development published by the Program for International Assessment of Adult Competencies (U.S.D.O.E., n.d. c), Americans scored average in literacy skills competencies but scored last in basic technology skills competencies. For American students a shift to blended learning offers solutions to both of these issues because, with strategic implementation students can learn useful ways to incorporate technology functions into their daily lives and interact with a variety of print and electronic reading materials in meaningful ways to support student literacy.

In addition to divides that exist both for technology access and for how technology is being used, Cooper (2006) also noted evidence suggesting that a divide exists regarding gender and technology use. Talley et al. (2012) concluded that male and female students tend to use technology for different purposes, such that female students reported using technology for publishing, editing, and communicating more often than male students. Addressing these phenomena, the National Education Technology Plan (NETP) released by the U.S.D.O.E. in 2016 defined the “new” digital divide as “the disparity between students who use technology to create, design, build, explore, and collaborate and those who simply use technology to consume media passively” (p. 18). Part of successful blended learning implementation should be to train students in effective, active, goal-oriented use of technology.

Gender. With regard to a gender-based digital divide, researchers provide conflicting evidence, with some finding no significant difference between male and female achievement while others note disparities (Blowers, 2015; Cooper, 2006; Kay et al., 2010; Nelson, 2011;

Straus, 2011; Talley et al., 2012; Taylor, 2014). In a study examining gender and technology use in two traditional schools and three one-to-one, blended learning schools in western Massachusetts, Kay et al. (2010) reviewed surveys in addition to math and language arts assessment data from Massachusetts Comprehensive Assessment System (MCAS)] scores to measure student achievement. With regard to gender and amount of technology use, researchers found no differences between boys and girls; however, there was evidence of a relationship between the purposes of use and student test scores with regard to gender, but those differences were not statistically significant either. Researchers (Kay et al., 2010) concluded that the scores of boys seem to be more negatively affected when computers are used for writing and research, but the scores of girls are not adversely affected. This may suggest that, in comparison to their female counterparts, boys may be at a disadvantage when using computers as a primary learning tool. In addition to these findings regarding gender, the researchers reported that both using computers for home entertainment and using computers as tools for writing and research were significant factors in predicting English Language Arts (ELA) scores, which further substantiates the need for all students, male and female, to engage in meaningful use of technology for learning experiences that positively affect student achievement.

Researchers have noted another type of gender gap with regard to the national trends that male students tend to be higher achieving in mathematics and science content areas while female students tend to be higher achieving in English (Chargois, 2014; Cooper, 2006, Dernikos, 2015; Disenhaus, 2015; Nelson, 2011; Smith, 2012; Vigdor, 2010). In a study of high school seniors regarding differences in attitudes and gender during one-to-one, blended learning, Nelson (2011) found that boys were more often encouraged to pursue careers in computer science than girls by both mothers and fathers. Chargois (2014) reported that, in her study of 6th through 12th grade students in the Vermilion Parish School District, gender gaps in achievement were reduced when teacher-student interactions were decreased through the use of incorporating online learning into courses with achievement gaps. These studies of Chargois (2014) and Nelson (2011) indicated the significant impact that adults can have in influencing male and female students' interactions with technology and their subsequent learning experiences. This suggested that the use of blended learning helps to reduce teacher bias that may affect student learning and may even reduce help in reducing parental bias in preparing male or female students for computing science careers. Districts strategically implementing one-to-one blended learning initiatives have the potential to bridge digital divides with regard to SES and gender as well as existing divides in digital use. This would involve not only providing devices but also educating teachers, students, and families on practical uses for the devices that ultimately support student learning.

Quality of Implementation

Contemporary literature indicates that blended learning is not typically the sole factor in increasing student achievement in schools. Researchers indicate the significance of quality of instruction, instructional technology integration in the learning environment, professional development, and administrative support as key factors (Ramsdell, 2014). In combination these variables have the potential to positively impact student achievement. Because the quality of instruction is a significant factor in a student outcomes, Horn and Staker (2015) emphasized that developing blended learning methods that meet the instructional needs of teachers may be the most important factor in the success of blended learning in schools in the long term. According to Sullivan (2010), the same strategies of good teaching that are used to support teaching with traditional text are still required strategies for developing teaching methods that are enhanced with technology. Effective teachers are able to use traditional texts or technology tools that support student needs effectively. With support of school administrators, teachers must be well versed in blended learning methodology and have sufficient access to educational technology for students.

However, researchers certainly are not suggesting that educators completely disregard traditional instructional practices but that they take advantage of benefits of both online learning and traditional learning such that when integrating technology tools is not effective in supporting students as they create, collaborate, and learn, then teachers can use traditional teaching methods to support student learning as needed (Chewning, 2015). Researchers also emphasize that the use of online learning does not replace the need for an effective teacher because teachers who do not have as much experience teaching their content areas will risk not being able to effectively integrate traditional practices or differentiated instructional practices when needed, and without a teacher, there is no one to monitor, adjust, or clarify instruction for students as needed (Chewning, 2015; Jovanovic et al., 2015). Teacher experience in both instruction and classroom management as well as teacher perception of benefits of blended learning can strongly influence one-to-one technology implementation outcomes for students.

When researching teacher perceptions of one-to-one computing and student engagement during the first year of a one-to-one implementation in three suburban New Jersey schools with grades ranging from 4 through 12, Fiorillo (2015) determined that one-to-one computing offers many benefits to schools, it can also bring about many obstacles that will need to be overcome, and teachers in Fiorillo’s study expressed concern in needed to cope with the obstacles they identified in their schools. Over two thirds of the teachers surveyed reported that student engagement either stayed the same or decreased. Fiorillo recommended separating teacher concerns with behavior from problems regarding use of technology devices so that teachers and administrators can work together to form a reasonable discipline plan to cope with behavioral issues so that teachers can minimize distractions from instructional time. Hoyer (2011) provided an example of this. Based on a study of secondary schools implementing one-to-one technology initiatives in Texas, Hoyer reported that because students do not want to lose access to their laptops, disciplinary incidents have decreased because administrators are leveraging laptops as a tool in managing student behavior.

Heath (2015) reviewed ACT scores from 33 public secondary schools across Alabama and North Carolina and surveyed 122 teachers to study the correlation between ACT scores and one-to-one computing. Heath reported that mean student ACT scores increased in the schools he studied, but mean student ACT composite scores and content area subtest scores had not significantly changed, nor was a statistically significant relationship found with regard to teacher perceptions of technology use or teacher perceptions of improvements in ACT scores. However, Heath reported that the more years of experience a teacher has, the less positive the teacher's perception is likely to be with regard to one-to-one computing, and teacher perceptions of one-to-one computing affect how often teachers implement blended learning strategies in their classrooms. Therefore, teachers who are newer to the field of education are more likely to perceive one-to-one computing as beneficial and more likely to implement blended learning strategies in their classrooms, and their positive attitudes may influence positive learning outcomes for their students.

Impact of Instruction. According to *The MetLife Survey of the American Teacher* (2012), teachers are the most influential school factor in affecting student achievement with teacher effectiveness directly representing 33% of a school's impact on gains in student achievement. Harvard and Columbia researchers Chetty, Friedman, and Rockoff (2011) conducted a study of value-added measures ("teachers' impacts on students' test scores") by reviewing student data from 2.5 million students in grades 3 through 8 and connected to parent tax records. The researchers reported that students who were in classes of teachers with high value-added scores are more likely to make decisions that elicit more successful outcomes than they would otherwise make, including attending college and especially higher-ranking colleges, earning higher salaries, living in neighborhoods with lower poverty rates, and choosing to save more money for future goals like retirement. Additionally, researchers concluded that students' lifetime income would increase by over $250,000 for the average classroom if an average teacher were placed in the position of a teacher with a value-added ranking in the lowest 5% of teachers, which further illustrates the magnitude of the influence that highly effective teachers have on their students.

To have a substantial impact on students' lives, teachers must do more than simply use computers for the sake of using computers (Gielneck et al., 2012; Jovanovic et al., 2015; Prososki, 2015; Sullivan, 2010). Jovanovic et al. (2015) described a link between student achievement and the teacher alignment of learning objectives with learning materials that typically takes place when teachers design hybrid learning experiences for students. Using technology to effectively support learning requires instructional shifts in use of curriculum materials and learning activities that support student learning. Sullivan (2010) described early experiences with classroom technology with the vivid details of teachers trying out the new features of Microsoft PowerPoint during the 1990s while they and their students tended to focus on the fonts, sounds, and styles of the slides rather than the content of the presentations themselves. The process of creating a presentation was time consuming as teachers learning the new technology worked heavily on design features rather than conveying information, and students were distracted by the sights and sounds of the show.

Voices from the Middle editors Fisher, Frey, and Lapp (2014) described blended learning in the classroom as a third space, one that combines the face-to-face classroom experience with virtual platforms that support student learning. The brick-and-mortar face-to-face classroom and virtual experiences through technology are merged as one space in which technology platforms and physical environments are intertwined to support engaging, interactive student learning experiences. This blended experience is also one that supports various instructional methods that include differentiation, student independent work, collaboration, and direct instruction. It also transcends traditional boundaries of the brick-and-mortar classroom because students can learn in the classroom with their teachers but also have access to learning experiences when physically apart from their teachers during the school day or outside of school hours (Fisher et al., 2014; U.S.D.O.E., 2015). Through the blended learning experience, teachers can design materials and digital learning spaces for students, helping students to set goals and plan learning paths, so that students can work independently and self-paced while teachers facilitate learning activities, provide immediate feedback when speaking to individual students, and adjust to differentiate as needed per student (Benson & Childress, 2014). With regard to helping struggling readers, Meyer (2016), Principal of Salk Middle School in Spokane, Washington, asserts that a benefit of web-based platforms is that teachers can retrieve timely progress reports for each student to check progress and design either enrichment or remediation follow-up as needed per student. In this way blended learning aids in both instructional differentiation and teacher-to-parent communication. Through technology implementation blended learning also makes available more outlets for students to have some choice in topics of content and digital interfaces with which they interact in order to further personalize their learning experiences independently and with peers (Arnett, 2014; de Roock, 2015; Standley, 2012).

Hicks and Turner (2013) acknowledged that teachers must adapt literacy instruction to the rapidly changing nature of literacy in response to the digital age. Effective teachers must use technology in ways that engage students. Hicks and Turner (2013) warn against the use of tedious lecture slides, using blogs for teacher question and student response without supporting student-to-student engagement, criticizing students' informal communication online, asking search-engine-style questions, and using technology bells and whistles to dress up teacher centered, direct instruction lessons. Jan Rashid, superintendent for instructional services for Des Plaines Community Consolidated School District 62 in Illinois, explained to *Tech and Learning* that skills required for reading digital and print texts are different and that both should be practiced through what students do daily in the classroom because these reading skills are critical for success in life, not simply for testing situations ("Blended Learning," 2015).

In a study of digital learning tools used in a blended learning course, Abulibdeh and Ishtaiwa (2012) reported that digital learning tools can also help students break through barriers that may exist during face-to-face classroom instruction. For example, some students may be reticent to speak aloud in class in front of adults or peers, but when given the opportunity to type a response or show digital work, they are more confident. Additionally, some students need extra time to develop their responses and have the time to construct work output and responses that better represent their capabilities than they what they would say aloud if put on the spot in front of their peers. Literature on blended learning conveys the benefits of students having capacity for multimodal communication and engagement with each other, their teachers, and course content.

In her case study of students in a large high school in Southwest Missouri, Ramsdell (2014) found that on seven out of eight End-of-Course exams student achievement increased after the implementation of a one-to-one blended learning initiative, and that the teachers in the school exhibited an unexpected desire for professional development in the use of instructional knowledge to support their students' learning. According to Ramsdell the teachers in this study reported that they were eager to implement instructional technology and sought out professional development to meet their needs. These findings suggest that there is a positive correlation between teacher engagement in the one-to-one implementation process and student success. When teachers take an active role interest in the one-to-one implementation and have positive perceptions of the impact of one-to-one technology use in their schools, they may be more likely to support their students in making gains in achievement.

To effectively use technology to support student learning, teachers must build capacity (Rowe, 2014; Sprenger, 2010; Strother, 2013; Tacket, 2014). Teacher use of technology must be transformative in that simply using technology to automate traditional instructional practices is ineffective; however, designing experiences in which teachers facilitate opportunities for students to make meaning or show their learning in authentic ways enhances opportunities for student learning (Chewning, 2015). According to Hicks and Turner (2013) the role of the English teacher has changed. English teachers now have the responsibility to advocate for and redesign a new way of using technology that moves beyond the use of basic worksheets and paper-and-pencil skill drills to more fully support digital literacy such that technology in the classroom is repurposed to support student literacy skills acquisition. According to Williamson (2013) of the

Literacy in Learning Exchange, educators now must recognize that the literacy process of reading and writing are required across all curriculum content areas and that all teachers of every content area must support student literacy. In a blended learning environment with a one-to-one student-to-computer ratio, all content area teachers must work together to support digital literacy and effective technology implementation to support student learning in all content areas.

In a study of vocational high school students in Taiwan researchers Cheng, Liang, Ju-Shih, and Yu- Sheng (2014) found that student perceptions of their own learning while in blended environments were more positive than students who participated in more traditional learning environments. Researchers emphasized the importance of having an availability of a wide range of e-learning instructional materials, teachers facilitating peer-to-peer interactions to support student collaborative learning experiences, teachers assessing student learning, and teachers providing students with ability to complete self-assessment of their learning.

If teachers are not adequately supported and trained in implementing blended learning strategies or if teachers do not believe that blended learning is useful, student achievement can be adversely affected (Bodden-White, 2015; Chewning, 2015; Chang et al., 2014; Gielniek et al., 2012; Marable, 2011). In a study of the effects of teacher perception of instructional technology on teacher and study use of technology for learning purposes, Chewning (2015) reported that quality of professional development received and support of school and district leaders affect teacher beliefs about the usefulness of technology resources, and teachers who are not receptive to technology use may be resistant to supporting school one-to-one initiatives (Chewning, 2015). Adding to this body of literature on teacher beliefs and technology implementation, Methvin (2015) reported that teacher self-efficacy in technology use affects the extent to which teachers use technology in their classrooms to support student learning and the quality of that technology implementation.

TPACK Framework. Technology, pedagogy, and content knowledge (TPACK) is a framework for successful integration of technology into instruction, and its development is essential for use by teachers in effectively supporting student learning with technology (Koehler & Mishra, 2009). The craft of teaching is complex, and it requires teachers to be flexible and adaptive to constant change, accessing and integrating various domains of knowledge, "including knowledge of student thinking and learning, knowledge of subject matter, and increasingly, knowledge of technology" (p. 61). Koehler and Mishra (2009) emphasize that classroom instruction and student learning involve dynamic phenomena. Therefore, school leaders should provide professional development for teachers in the areas highlighted by the TPACK Framework. In turn, teachers need time to learn more about and reflect their practice with regard to areas of the TPACK Framework (Chewning, 2015; Gielneck et al., 2012; Koehler & Mishra, 2009). The model of TPACK framework contains the "three main components of teachers' knowledge: content, pedagogy, and technology," and "equally important to the model are the interactions between and among these bodies of knowledge, represented as PCK [pedagogical content knowledge], TCK (technological content knowledge), TPK (technological pedagogical knowledge), and TPACK" (p. 62). TPACK is a flexible, dynamic, practical method of approaching implementation of instructional technology and high quality teachers use elements of TPACK every time they teach. Transforming instruction so that students use digital resources in authentic ways to engage in learning experiences is a process that takes time even beyond the first year of one-to-one blended learning implementation (Chewning, 2015).

Impact of Leadership Support. Metlife (2012) also indicated principals as critical to establishing and supporting a sustainable school culture for success in teaching and learning, noting that a principal can influence 25% of a school's impact on student achievement. Various schools within a district can have different methods of blended learning implementation. School culture, especially with regard to faculty attitudes toward effective technology use and whether they are adequately supported, has potential to make or break a blended learning initiative (Chewning, 2015).

Hoyer (2011) conducted a phenomenological study of school district leaders of secondary schools in Texas within the scope of 2 years before one-to-one implementation and 2 years after the one-to-one implementation. Participants of Hoyer's study were "superintendents, principals, technology directors, business managers, instructional technologists, and curriculum directors" (p. 96). Hoyer concluded that students have the same capacity to learn whether technology is used or not, use of technology does not improve student achievement, good teaching is good teaching regardless of whether technology is used or not, use of technology has money-saving potential for school districts if managed wisely, use of technology can level the playing field for students who are economically disadvantaged, and all stakeholders must be committed and motivated for a technology initiative to elicit school improvement. These conclusions were all drawn from themes that emerged during interviews with the school leaders participating in Hoyer's study.

Although school leaders are not in the classroom, Bodden-White's 2015 research on the impact of leadership support suggested that they have a significant impact on how often teachers incorporate blended learning strategies into their instruction. In Bodden-White's study most teachers reported that the school principal was the leader who most strongly influenced their use of blended learning. Teachers who perceive that their leaders support them in the use of blended strategies incorporate blended learning strategies more often than teachers who perceive that their leaders are not supportive. Leaders can support teachers by facilitating opportunities for meaningful professional development, meaningful professional collaboration among teachers, and cycles of in-class coaching and feedback. Bodden-White also reported that when teachers used blended instructional methods, they perceived that their students had higher levels of engagement, motivation, and happiness.

Johnson, Uline, and Perez (2011) studied the classroom observation focal points of principals of high performing urban schools in America, and they reported that a primary focus of principals was on levels of student engagement in the classroom. Principals who advocate for student interaction and participation during the learning process rather than student passive attentiveness tend to influence teachers to incorporate varied instructional strategies that engage these students in ways that boost student achievement. Beyond teacher instruction as the leading factor in student achievement, principal leadership is the second leading factor in student achievement, but researchers also report that principal leadership is primarily responsible for high levels of student engagement and positive school culture (Bodden-White, 2015; Johnson et al., 2011; Metlife, 2012).

Because principals are influential in both teachers' successful implementation of blended learning strategies and in student achievement levels, school leaders should be deliberate in planning meaningful professional development opportunities and support systems for teachers (Fiorillo, 2015; Prososki, 2015, Skevakis, 2010; Whicker, 2012). Sullivan (2010) described early experiences with professional development for classroom technology use as tedious and inefficient. Teachers withstood long-winded professional development sessions in which speakers told them a load of technical speak about the software they would be using in their new computer labs, but often the speakers did not provide practical instruction advice that could be used to make the technology immediately useful in an efficient, effective way to support classroom instruction. Researchers agree that schools must provide strong professional development opportunities for teachers and note that such opportunities should include considerable time for teachers to discuss, collaborate on, and share best practices in blended instruction that are working in their classrooms. Long, boring professional development sessions that do not model and address techniques that teachers can take and use immediately with their content area classes are ineffective in meeting teacher needs and, in turn, student learning. In addition to planning meaningful content and structure of professional development sessions, another challenge that school leaders must consider is that technology is rapidly changing, so ongoing training is needed to ensure that teachers are equipped with adaptable, relevant, timely skills and knowledge for implementing technology to support learning (Harris, 2013; Prososki, 2015; Tackett, 2014).

To ensure that professional development meets the needs of teachers who are on the front lines of blended learning implementation with their students school leaders should be receptive to suggestions and requests from teachers and teacher teams during the planning process (Whicker, 2012). Davis (2009) asserted that school leaders must be aware of teacher apprehension with regard to both fear of urgency and fear of failure, being sensitive to these fears when supporting teachers. For district leaders Horn and Staker (2015) recommended facilitating and developing teacher teams that have authority in design and implementation of blended learning initiatives within school districts so that teachers have autonomy to try new strategies and be exert creativity in development of instructional design and student learning opportunities. Essentially, the nature of the contemporary Digital Age provides ample opportunities and resources that schools can leverage in support of student learning, and the possibilities of what these resources can be used to help students grow and achieve is a motivating factor in blended learning efforts for school districts and teachers. When school leaders establish safe zones for creativity in which teachers can try and retry new ideas, teachers are less inhibited by their fears and more likely to learn and grow from “failures,” which will result in beneficial blended learning experiences for their students. Teachers and students alike derive intrinsic motivation from doing work that is personally fulfilling, carries a sense of personal responsibility, elicits recognition, and earns achievement (Horn & Staker, 2015; Sergiovanni, 2007).

In addition to establishing a school culture that is conducive to blended learning practices that support students and teachers, school leaders must also work to stimulate transformation efforts that can be sustained and cultivated over time to ensure that the school and district can have continued growth and success with blended learning. Infrastructure must be well planned and maintained. In a study of one-to-one implementation in North Carolina middle schools Bashawn (2013) reported that inadequate implementation of one-to-one models was typically the root cause of failure, especially with regard to poor infrastructure, lack of financial planning, lack of professional development or support for teachers, and insufficient technical support personnel. Schools must be able to maintain properly working devices for students, ensure that students have quality Internet access at school, and ensure that quality Internet access is available to each student’s household (Davis, 2009). All of this requires leadership planning in how financial needs will be met. Managing the financial responsibilities of a shift to blended learning will pay dividends in the long run because, ultimately, effective schools foster economic growth and support global marketplace competition (Bashawn, 2013; Davis, 2009; Gielneck et al., 2012; Horn & Staker, 2015).

Maryville City Schools iReach Blended Learning Model

Leaders of Maryville City Schools (MCS) in Maryville, Tennessee, explored Project RED research (Gielniek et al., 2012) and the TPACK Framework (Koehler & Mishra, 2009) when preparing to implement its own district wide blended learning model. MCS is implementing a blended learning initiative called iReach with emphasis on the iReach mission "to infuse technology and shift instructional practices in ways that create limitless learning opportunities for all twenty-first century learners in the Maryville City Schools" (MCS). As of the 2015-2016 school year, each student in grades Kindergarten through 4 has received a district issued iPad, and each student in grades 5 through 12 has received a district issued laptop. Teachers in the district are engaging in professional development to strengthen their use of instructional technology to support student learning.

District leaders must have a plan in place for rapid and effective implementation of the one-to-one technology initiative so as not to lose time on ineffective execution and to achieve desired results and action steps by all essential stakeholders (Davis, 2009). From 2011 through 2014 MCS district leaders set out to establish a strategy map for instruction and a plan for effectively integrating technology into every classroom. According to the strategy map the district has now embarked on a 3-year process for full implementation of iReach so that every student and teacher not only has a device but is able to use devices to effectively and efficiently support student learning. The initial phase in 2014-2015 was called EXPLORE: Early Adopter Implementation. During this phase of the strategy map 30% of MCS teachers became early adopters of devices to pilot devices in their classrooms with students. The student devices remained in the classrooms of teachers who were early adopters and were not assigned to specific students. During this phase, district technology support personnel worked to strengthen physical and digital infrastructure, and teachers collaborated to plan changes in pedagogy with attention to curriculum and how technology tools can be used to support student learning in preparation for the full implementation of iReach in the coming school year (MCS, 2015.

The second phase of this process in 2015-2016 is called ENGAGE: Full Deployment. During this phase 100% of teachers are required to participate in implementation of the iReach initiative, and 100% of students have access to a mobile device every day. The school system now has a one-to-one digital device ratio for K-12th grade students. Students in K-3 have iPads that they use and store in their classrooms. Laptops have been deployed to students in grades 4-12 for school and home use. Each school has site-based technical support personnel, and in grades 4-12, each school provides a student staffed help desk to help with general technology support and also for the students to prepare for earning industry certifications in high school grades (MCS, 2015). Teachers and administrators are engaging in high quality professional development and collaboration to continuously improve instructional strategies and technology integration, district administrators and technology personnel are working to build and further strengthen the physical and digital infrastructure of the school community, and the school district is documenting the progress and process of the iReach digital conversion to share ideas and collaborate with other districts around the state and nation.

The upcoming 2016-2017 year is called EMPOWER: Limitless Learning and Instruction, and MCS teachers will continue to use TPACK to enhance blended learning instructional practices to support instructional shifts that will elicit the following elements: student-centered learning output, student-centered instructional practices, personalized learning, differentiated instruction, student engagement, around the clock access to learning materials at any location, project based learning experiences, flipped classroom learning experiences, creativity of learning output, authentic learning output, meaningful communication, rich collaborative experiences, rigorous critical thinking experiences, meaningful data collection to be used during instructional planning, a readily accessible variety of digital instructional tools, and international networking capabilities (MCS, 2015). Teachers will continue to engage in high quality professional development, build teacher leadership, and share iReach successes at national conferences. The district is also planning to invite others in the state and nation to attend site visits and learn more about it in order to implement blended learning strategies The district will provide more course offerings for computer science and foreign languages, and the district will continue to support and advocate for digital citizenship in all content areas and in ways that support digital citizenship for students in their using of technology tools. All of these endeavors are to support district endeavors to create limitless learning opportunities for students and prepare them to be future ready.

Core data for this research have been collected from the first and second phase of this iReach digital conversion. Data have been collected from the 2014-2015 school year, before the full, one-to-one device implementation and from the 2015-2016 school year, during the first full, one-to-one device implementation. Data from this pivotal point of change may shed light on aspects of how access to technology and instructional shifts have affected student learning experiences.

Components for Successful Digital Conversion

Based on her study of a one-to-one technology conversion at a suburban American high school, Davis (2009) articulated six core components for successful one-to-one blended learning implementation: "Focused Committed Leadership, Community Involvement, High Quality Ongoing Professional Development, Curriculum and Instruction, Infrastructure and Software Tools, and Understanding the Change Progress" (p. 119). MCS is addressing each of these components in its current implementation of iReach.

Focused Committed Leadership. In his welcome message on the district website, MCS Director of Schools Mike Winstead explains, “Our district strategic plan is our roadmap to the future – serving as a guidepost for decision making at all levels” (MCS, n.d.). Central Office administrators including, Mike Winstead, Assistant Director of Schools Rick Wilson, iReach Implementation Team Leader Amy Vagnier, and Director of Communication and Special Projects Sharon Anglim email and visit with schools and teachers within the district periodically throughout the year. School principals and assistant principals visit teachers’ classrooms periodically throughout the year and communicate with teachers. Each school has a technology coordinator on site to assist with technology needs, and early adopter teachers from the first implementation phase also assist other teachers as needed. Early adopter teachers and teachers who have novel ideas to share with others lead district professional development opportunities for teachers and administrators to spread ideas and best practices. These organization elements contribute to a sense of connectedness and mutual respect among faculty and leadership throughout the MCS school district.

Additionally, district leaders have facilitated and supported the emergence of multidisciplinary leadership teams comprised of faculty and administrators to serve a variety of purposes in support of and coinciding with the iReach digital conversion. Three such examples among many are the district community friends group (CFG), the CoSN committee, and teacher-led professional development opportunities.

Community Involvement. In his welcome message on the district website, MCS Director of Schools Mike Winstead begins his message by thanking visitors “for taking time to visit” the MCS website and explaining, “The tools and resources provided on this site are for your use as a stakeholder and our partner in education. Two-way communication is critical to our success.” Winstead reaches out to the community through the website and provides outlets for two-way communication for various purposes. By establishing a sense of accessibility, the Director of Schools strengthens community connections. Throughout the digital conversion for iReach, the school district maintains communication and relationships with community agencies for a variety of purposes. One central way that MCS has engaged the community in supporting these efforts is through working to ensure that all students have access to Wi-Fi on school campuses, at students’ homes, and in community hotspots. The school offers Hot Spots that can be rented as need for students on class or team field trips during which students need to work online for school purposes. Free or reduced online services are also offered by EveryOneOn, “which is an organization working to close the digital divide by connecting unserved households with Wi-Fi. In the school community, free Wi-Fi is also offered at the Blount County Public Library and many other community business and organization locations. These free Wi-Fi access locations are listed publicly in a Community Wi-Fi directory provided by the Blount County Chamber Partnership.

In addition to the free Wi-Fi zone offered for MCS students by community partners in in Blount County the school district also publishes informational updates on iReach for the school community both on its website and in local news sources. MCS also enlists support from local organizations in various ways. For example, for staff professional development meetings, staff celebrations of district progress, and development of instructional support videos for parents, students, and district employees, MCS has collaborated with Foothills Church for both event accommodations and technology for high quality audiovisual production.

MCS not only works with community organizations and ensures that students have access to free Wi-Fi, but the school district also maintains open lines of communication with parents by providing updates via updating the district website, emailing updates and newsletters about iReach periodically, and sending prerecorded phone messages as needed. Director of Schools Mike Winstead shared at 2015 beginning-of-year school-wide in-services with teachers that some parents have shared with him that this is the first time they have had computers in their homes and that they are excited to learn to use them along with their children. Partnering with parents to support student learning is also a strategic objective set forth for iReach (MCS, 2015). Parents can access student grades and work, and they can contact teachers and administrators via email. Each school also offers various forms of online and face-to-face technology support for parents as needed.

High Quality Ongoing Professional Development. MCS emphasizes that teachers and students need both technical and instructional support to be successful in implementing blended learning for the iReach digital conversion (Maryville City Schools, n.d.). Each school in the district has a technology coordinator on site to assist with technology needs, and early adopter teachers from the first implementation phase also assist other teachers as needed. Early adopter teachers and teachers who have novel ideas to share with others lead district professional development opportunities for teachers and administrators to spread ideas and best practices. Teachers collaborate during daily planning periods on building resources to integrate technology into lessons in ways that support student learning. District administrators emphasize the use of TPACK in instructional planning and advocate teacher reflection in personal acumen with regard to areas of TPACK. According to the Instructional Implementation Plan, “effective teachers are willing to implement technology tools and engage in ongoing professional development to grow an understanding of devices and the benefits of preparing students for college and career," and effective MCS teachers building in technology components to support their instructional practices and student learning are continuing to demonstrate the longstanding reputation of academic excellence in Maryville (Maryville City Schools, 2015).

School level and district wide professional development sessions are offered to support teachers in technology integration and use. Most district-wide professional development offerings are provided through a system of courses called iReach U, which are teacher-led. MCS Director of Schools Mike Winstead encourages teachers to lead professional development and to take part in professional development so that technology skills they learn and practice are relevant, meaningful, and practical in supporting day-to-day work with students in the classrom (Maryville City Schools, n.d.). Based on professional development structure and course offerings that have already been available to teachers throughout iReach implementation as well as leadership support for teacher development and successful instructional technology integration, high-quality ongoing professional development is evident within this school district.

Curriculum and Instruction. MCS acknowledges that the iReach digital conversion requires a transformation of pedagogy such that teachers harness new technology tools to prepare students with skills to be competitive in industry, business, and academia outside the K-12 classroom. These changes will support teachers in implementing "best and next practices" to support student engagement in the classroom (Maryville City Schools, n.d.). MCS teachers plan instruction in alignment with Tennessee State Standards and in alignment with TPACK blended instruction philosophies (Maryville City Schools, 2015), and they each use Blackboard as a learning management system (LMS) for providing and organization course content and communication with students and parents.

Infrastructure and Software Tools. MCS provides and pilots a variety of hardware and software tools to support blended learning in every classroom, including digital assessment tools, digital communication tools, differentiated instruction software for various content areas, iPad apps, web-based instructional tools, Microsoft 365 applications, and audiovisual presentation equipment. District technology coordinators filter requests and needs from faculty members to determine which tools need to be purchased and also make recommendations for which technology or applications can be used to meet teacher needs. Tools may be purchased by department, school level, or district level funds, or they can be purchased through outside grants or grants funded by the Maryville City Schools Foundation. For the one-to-one devices each student is required to pay a fee for use, and there are scholarships and payment plans available to families that need financial assistance (MCS, 2015). Additionally, each school provides a technology help desk for students, parents, and faculty who need troubleshooting assistance.

Understanding Change. The systematic plan for iReach implementation as well as both the abundant availability of teacher professional development and the structure of tiered leadership support reflect an understanding of supports and planning needed for smooth transitions during times of change. Examples of ways that district is taking determined measures to understand, process, and guide change are the district CFG sessions focused on iReach, the availability of leadership opportunities for teachers to lead and collaborate with colleagues throughout this digital conversion, and the Maryville Junior High School faculty book study of *Stratosphere: Integrating Technology, Pedagogy, and Change* by Fullan.

Need for Data

The availability of research on iReach is limited because the instructional model is relatively new and has not yet been subjected to numerous research studies. The initial implementation of iReach has also occurred simultaneously with the implementation of the new TNReady assessment system for Tennessee schools during the 2015-2016 school year. Therefore, comparative assessment data from the state level are unavailable for students participating in the first year of iReach. The Scholastic Reading Inventory (SRI) Reading Comprehension Assessment is a literacy assessment tool used for all Maryville City Schools students in grades 8 and 9 to measure achievement in reading, and it can be used for comparative data analysis for students in grades 8 and 9.

With regard to education reform of this magnitude, school leaders and teachers need to establish and use guideposts (Wiggins & McTighe, 2007). Wiggins and McTighe emphasize the importance of determining not only goals but also a plan for gathering evidence to determine when and if goals are met. Then, an action plan with specific steps for meeting those goals can be established, and assessment guideposts should be regularly monitored to determine if stakeholders should proceed with action steps or if action steps need to be adjusted as evidence indicates. For Maryville City School the SRI serves as one measure of this type of "mission-critical evidence" described by Wiggins and McTighe (p. 229). The iReach model affects all students and all curriculum content areas, and students are expected to use technology for digital reading and writing experiences in every content area. Because literacy and technology skills are reinforced in every content area, the SRI reading achievement data can serve as one district-wide indicator of student achievement in grades and nine as the district undergoes changes related to iReach.

Data analysis for this study was based on SRI Lexile scores collected from the 2015-2016 cohort of ninth grade students in Maryville City Schools. This dataset was used to measure Lexile growth from pre-and posttest scores during the 2014-2015 school year before the implementation of the iReach blended learning model and to measure Lexile growth from pre- and posttest scores during the 2015-2016 school year during the first year of the full implementation of the iReach blended learning model.

Reading Comprehension as a Guidepost. The Reading Comprehension Assessment is a criterion-referenced test used to measure achievement in reading, and it generates reading Lexile scores for individual students. With regard to pedagogy the use of Lexile measures helps teachers select appropriate texts for students, and in terms of data analysis the Lexile Framework can be used to monitor student growth in reading using a common scale of measurement over time (Scholastic, n.d.). Although division exists among researchers about the validity of the vertical Lexile scale as an equal-interval tool of measurement, as a measure for student growth, the Lexile scale provides a valuable, reliable point of reference (Briggs, 2013).

Briggs (2013) analyzed the Lexile scale with regard to the framework of the theory of conjoint measurement, which allows researchers to quantify psychological attributes using quantifiably measurable units. Findings revealed that "the Lexile scale appears to have considerable utility as a tool for generating criterion-referenced reading assignments with possible diagnostic advantages" (p. 219). Briggs suggested that there is not a simple, one-size-fits-all, annual expected Lexile growth amount that all kids should meet each year, but rather that students grow more or less in their reading abilities depending on the stage of learning they are in at the time they are assessed. For example, early readers tend to make gains in Lexile scores at larger increments than experienced readers in a given year. Therefore, the Lexile scale is more appropriate for measuring growth in reading ability than for measuring reading ability as a static attribute (Williamson, 2006).

In Maryville City Schools all students in grades 8 and 9 are required to take the SRI quarterly as a middle grades literacy checkpoint within the district. Therefore, the 2015-2016 cohort of grade 9 students have quarterly Lexile scores from their ninth grade year during the first year of the iReach implementation, and they also have quarterly Lexile scores from their eighth grade year before the implementation of iReach. This cohort of students is in a unique position within the district to produce reading achievement data from before and after the implementation of this blended learning model at a time when state level comparative achievement data are not available.

If a drop in SRI reading Lexile growth occurs during the first year of full iReach implementation in relation to the growth experienced prior to full iReach implementation, it could suggest that students experience a lag in reading skills acquisition as they acclimate to changes in their learning environment in relation to iReach implementation or other change. On the contrary, if an increase in SRI reading Lexile growth occurs during the first year of full iReach implementation in relation to the growth experienced prior to full iReach implementation, it could suggest that students experience a boost in reading skills acquisition as a result of changes in their learning environment in relation to iReach implementation or other change. Although it can only provide a snapshot of progress for grades 8 and 9 students during the initial implementation of iReach, data elicited by the SRI can serve as a critical guidepost for district administrators to monitor progress and make deliberate adjustments as needed in response to the data indicators.

Chapter Summary

In recent decades technological devices, connectivity, and capabilities have evolved dramatically, and American leaders have been promoting educational use of technology to support student learning and ensure that American students are equipped with college and career readiness skills for success in the contemporary digital age. The state of Tennessee has been nationally recognized as a frontrunner in these educational endeavors, and school districts across Tennessee and the nation have been implementing one-to-one technology initiatives to support blended learning models in schools.

With one-to-one student access to both computers and Internet connectivity, schools systems can work to bridge digital divides based on gender and SES as well as divides in digital use. In an ideal blended learning environment teacher instruction would reflect TPACK domains as well as address the levels of Bloom's Revised Digital Taxonomy. With sufficient professional development, collegial collaboration, and leadership support teachers in blended learning environments become facilitators and mentors as they differentiate learning paths for their students, and students have increased opportunities for choice and personalization of their learning paths toward meeting learning objectives. Administrators have great responsibilities in fostering school cultures that are conducive to teacher success and, in turn, student success in blended learning environments.

Maryville City Schools in Maryville, Tennessee, is implementing a one-to-one blended learning initiative called iReach. In preparation for the implementation of iReach, district leaders studied Project RED and TPACK research for guiding frameworks in planning, implementing, and sustaining a viable blended learning model. The iReach model affects all students and all curriculum content areas, and students are expected to use technology for digital reading and writing experiences in every content area. One assessment tool used by Maryville City Schools is the Scholastic Reading Inventory Reading Comprehension Assessment used for all students in grades 8 and 9 to measure achievement in reading. Because literacy and technology skills are reinforced in every content area, the Reading Comprehension Assessment achievement data can serve as one district-wide indicator of student achievement in grades 8 and 9 as the district undergoes changes related to iReach.

CHAPTER 3

RESEARCH METHODS

The purpose of this ex post facto quasi-experimental quantitative study was to compare student reading Lexile growth data collected through the use of the Scholastic Reading Inventory (SRI) College & Career Reading Comprehension Assessment subtest before and after iReach implementation to determine if there was a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools. The availability of research on the impact of iReach is limited because the blended learning instructional model is relatively new and has not yet been subjected to numerous research studies. The initial implementation of the iReach blended learning model in which every student in Maryville City Schools has a device to use every day has also occurred simultaneously with the implementation of the new TNReady assessment system for Tennessee schools during the 2015-2016 school year. Because of the transition from the former Tennessee Comprehensive Assessment Program (TCAP) to TNReady, comparative assessment data from the state level are not available for students in Maryville City Schools participating in the first year of iReach. Therefore, the Reading Comprehension Assessment data can serve as one district-wide indicator of student achievement in grades 8 and 9 as the district undergoes changes during the implementation of iReach.

Research Questions and Null Hypotheses

RQ1: Is there a significant difference between the reading Lexile growth scores of eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2015-2016 school year?

$H_0 1$: There is no significant difference between the reading Lexile growth scores of eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of the same cohort of students in ninth grade during the 2015-2016 school year.

RQ2: Is there a significant difference between the reading Lexile growth scores of male eighth grade students during the 2014-2015 school year and the growth scores of male students of the same cohort of ninth grade students during the 2015-2016 school year?

$H_0 2$: There is no significant difference between the reading Lexile growth scores of male eighth grade students during the 2014-2015 school year and the growth scores of male students of the same cohort of students in ninth grade during the 2015-2016 school year.

RQ3: Is there a significant difference between the reading Lexile growth scores of female eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of female students of the same cohort of ninth grade students during the 2015-2016 school year?

$H_0 3$: There is no significant difference between the reading Lexile growth scores of female eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of female students of the same cohort of students in ninth grade during the 2015-2016 school year.

RQ4: Is there a significant difference between the reading Lexile growth scores of economically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of economically disadvantaged ninth grade students of the same cohort during the 2015-2016 school year with regard to students who were enrolled in Maryville City Schools both years?

$H_0 4$: There is no significant difference between the reading Lexile growth scores of economically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of economically disadvantaged students of the same cohort of students in ninth grade during the 2015-2016 school year.

RQ5: Is there a significant difference between the reading Lexile growth scores of noneconomically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of noneconomically disadvantaged ninth grade students of the same cohort during the 2015-2016 school year?

$H_0$5: There is no significant difference between the reading Lexile growth scores of noneconomically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of noneconomically disadvantaged students of the same cohort of students in ninth grade during the 2015-2016 school year.

RQ6: Is there a significant difference between the reading Lexile growth scores of eighth grade students during the 2013-2014 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2014-2015 school year?

$H_0$6: There is no significant difference between the reading Lexile growth scores of eighth grade students during the 2013-2014 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2014-2015 school year.

RQ7: Is there a significant difference between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort?

$H_0$7: There is no significant difference between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort?

RQ8: Is there a significant difference between the rates of eighth to ninth grade reading Lexile growth of the freshman and sophomore cohorts?

$H_0$8: There is not a significant difference between the rates of eighth to ninth grade reading Lexile growth of the freshman and sophomore cohorts.

Population

The Maryville City School district is located in Maryville, Tennessee, which has a population of approximately 27,000 people and is located in Blount County at the base of the Great Smoky Mountains. The mission of Maryville City Schools is "to prepare students for a lifetime of learning and responsible citizenship," and with its reputation of academic excellence, Maryville City Schools is often the recipient of state and national recognition. The district was a winner of The SCORE Prize in 2011 a SCORE Prize Finalist in both 2012 and 2014. In 2014 Niche ranked Maryville City Schools first in the list of Best School Districts in Tennessee ("Maryville," 2014). In a progress report on the Every Student Succeeds Act (ESSA), Tennessee is recognized among four states "that have led the way with deep commitment to positive change" and that are "seeing meaningful gains in student achievement" (U.S.D.O.E., n.d. a). Maryville is certainly a contributor to the state's overall success in making gains in achievement. As an example of Tennessee schools that are leading the way in establishing high expectations for public school students and supporting Tennessee in becoming a nationwide leader in enhancing public education, SCORE (2014), the State Collaborative on Reforming Education, acknowledged that Maryville uses data to deliberately and strategically place students in courses that support their future academic and career growth and so that students are challenged with appropriately rigorous coursework. The school district has approximately 5,120 students in grades prekindergarten through 12, and it is comprised of two prekindergarten programs, one special education prekindergarten program, two alternative learning sites, three elementary schools, two intermediate schools, one junior high school, and one high school. All eighth and ninth grade students in this district attend Maryville Junior High School before moving on to Maryville High School.

This study is based on a cohort of 427 students, the 2015-2016 cohort of ninth grade students in Maryville City Schools. This number is sufficient because it consists of the entire population of ninth grade students rather than a representative sample of the population. Subgroups within this population of 2015-2016 ninth grade students in Maryville City Schools include 210 males, 217 females, approximately 103 economically disadvantaged students, and approximately 324 noneconomically disadvantaged students. However, mean reading Lexile gains of this cohort were compared to mean reading Lexile gains of the previous cohort in order to determine if Lexile gains for the 2015-2016 cohort of ninth grade students are unique or if they fit the growth pattern of the previous cohort. Therefore, the second sample for this study consists of the 2014-2015 cohort of ninth grade students in Maryville City Schools, which consists of an approximately similar demographic makeup.

In Maryville City Schools, all students in grades eight and nine are required to take the Reading Comprehension Assessment subtest of the SRI College & Career suite of assessments quarterly as a middle grades literacy checkpoint within the district. Therefore, the 2015-2016 cohort of grade 9 students have quarterly Lexile scores from their ninth grade year during the first year of the iReach implementation, and they also have quarterly Lexile scores from their eighth grade year before the implementation of iReach. This cohort of students is in a unique position within the district to produce reading achievement data from before and after the implementation of this blended learning model at a time when state level comparative achievement data are not available.

Instrumentation

I received Lexile score data from the SRI College & Career Reading Comprehension Assessment subtest, an assessment taken by the 2015-2016 cohort of ninth grade students at Maryville Junior High School during the students' eighth and ninth grade school years. This dataset was used to measure Lexile growth from pre- and posttest scores during the 2014-2015 school year before the implementation of the iReach blended learning model and to measure Lexile growth from pre- and posttest scores during the 2015-2016 school year during the first year of the full implementation of the iReach blended learning model. Then, this dataset was compared with a similarly collected data set from the previous, 2014-2015 cohort of ninth grade students to conduct a comparative analysis of means gains from both cohorts.

The Reading Comprehension Assessment is a criterion-referenced test used to measure achievement in reading. The Reading Comprehension Assessment is the part of the SRI College & Career suite of assessments that is targeted for grades 1-12. Teachers and administrators commonly refer to the Reading Comprehension Assessment subtest as the SRI, but there is also a separate subtest used for grades K-2. The Reading Comprehension Assessment was originally developed by the Scholastic Corporation as a paper-based assessment, then converted to a computer-based interface, and then adapted for web-based dissemination. In 2015 the Educational Technology and Services (EdTech) business formerly owned by Scholastic Corporation was acquired by Houghton Mifflin Harcourt, a transaction that transferred ownership of SRI products to Houghton Mifflin Harcourt. Early research supporting the Reading

Comprehension Assessment referred to the assessment as the SRI although it is now part of the SRI College & Career suite of assessments (Houghton Mifflin Harcourt, 2015).

To measure reading comprehension the Reading Comprehension Assessment is structured so that participants read various levels of passages of texts from various content areas that require the participants to use a combination of reading skills to comprehend what they are reading, and "these skills include referring to details in the passage, drawing conclusions, and making comparisons and generalizations" (Scholastic, 2014, p. 9) based on types of reading materials that students would typically read during school and outside of school, ranging from textbooks to prose fiction to magazines. Each question on the assessment contains a cloze reading passage, for which a test taker must select the response that best fits the blank in the passage. Because multiple answer choices could seem correct, to determine the correct response, a test taker must comprehend the context of the passage and how the correct response relates to the other parts of the passage. The purpose of this assessment is to determine a reader's Lexile measurement and monitor the reader's development of reading skills over time.

In a study of Florida teachers' use of the Reading Comprehension Assessment with students in grades 3 through 10 during the 2001-2002 school year, in collaboration with Scholastic Research and MetaMetrics, Kimberly Knutson (2011), a test development and evaluation specialist for the School District of Palm Beach County, concluded that the Reading Comprehension Assessment can be used systematically for reading progressing monitoring and differentiated instruction to meet identified needs of students as well as for supporting teachers to enhance instruction in alignment with state assessments that are used for reporting student achievement. Data from this research (Knutson, Scholastic Research, & MetaMetrics, 2011) indicated that there was a positive correlation between Reading Comprehension Assessment data and state assessment data in Florida such that Reading Comprehension Assessment data can be used to predict state assessment scores. Therefore, in the absence of state assessment data as in the case of English assessment data in the state of Tennessee during the shift from the TCAP test to the TN Ready test, Reading Comprehension Assessment data can serve as a consistent measure for student literacy skills for comparative analysis purposes during the interim.

The Reading Comprehension Assessment generates reading Lexile scores for individual students, and it is a computer adaptive assessment that provides a series of questions that adapt to a participant's reading level based on how the reader responds to each question. In this way, the assessment is individualized for each student who takes it. To further individualize student assessment questions and data collection during testing sessions after the initial assessment is given, the Reading Comprehension Assessment subtest has been created such that it uses a Bayesian scoring algorithm that predicts a participants future performance based on past performance in order to elicit more accurate results (Scholastic, 2014). With regard to pedagogy the Lexile Framework provides a common measuring scale to monitor student growth over time, and the Lexile measures aligned with this scale help students and teachers to select appropriate texts which are measured using the same scale (Scholastic, n.d.). Therefore, a Lexile attached to a text represents the reading comprehension ability level of a reader that is needed to sufficiently read the text for meaning.

The Lexile Framework for Reading provides a scale that educators can use to measure a student's reading ability and to measure the text complexity of materials that students read (MetaMetrics, 2016c). Lexile measures are different from grade equivalents. Grade equivalents are calculated when students in a particular grade level take norm-referenced tests based on norming groups for that grade level, so that "for example, a fifth grade student who earns a 5.9

on a norm-referenced test has earned a score similar to the 50th percentile students in the test's norming group who were in their ninth month of fifth grade," and "to obtain scores for all months and all grades outside of the norming group, scores are interpolated and extrapolated from the actual student scores" (MetaMetrics, 2016a, p. 9). There are many complications that can occur when interpreting grade equivalents.

For example, the raw score on a norm-referenced test that constitutes a grade equivalent would likely change if the test were renormed using different groups of students, so groups of students taking the same test but with results based on a different norming group cannot be compared to previous cohorts using grade equivalent data. Another issue to consider is that the grade equivalent is not the same as a target grade level standard because, as the equivalent represents the 50th percentile, it is representative of the average student score in the norming group, and the score of the average norming group student may not be a suitable goal for other students. Additionally, if a student scores a higher grade equivalent on a test that was normed fort he student’s own grade level, that would not mean that the student has mastered the standards of the higher grade level, it would only mean that the student scored far above average for the student’s current grade level based on the achievement of the norming group for that test. Another issue to consider when using grade equivalent data is that it is not representative of an equal-interval scale and cannot be used in statistical analysis that depends on the calculations of equal-interval units. For example, mean scores cannot be calculated based on grade equivalents. However, grade equivalents can be used to compare one student's achievement with the achievement of the norming group, which is typically a state or national sampling of students (MetaMetrics, 2016a).

The Lexile Framework provides a remedy for these concerns with grade equivalents. According to MetaMetrics ® Lexile measures of readers and of texts are represented on the same scale, and they are both reported by the use of a number in combination with the letter "L," such as 900L or 750L (MetaMetrics, 2016c). Lexile measures are distributed on an equal-interval scale and can be used for mathematical calculations requiring equal-interval units. Lexile measures are not based on norming groups, so students are not automatically compared to the progress of grade level peers, which can be harmful to self-esteem, and they can be paired with texts and instructional strategies to meet their needs with regard to their current developmental level of reading ability as represented by the Lexile Framework (MetaMetrics, 2016a). According to MetaMetrics ®, grade levels and Lexile measures are not directly related. The real power is not in attempting to measure grade levels by the use of the Lexile Framework but in helping readers find appropriate leveled texts to aid in facilitating their growth in reading comprehension. The Lexile Framework, when used to support student growth, is a powerful instructional tool for teachers because they can match texts with students in order to boost student learning and growth regardless of the grade level of the student (MetaMetrics, 2016b).

Although division exists among researchers about the validity of the vertical Lexile scale as an equal-interval tool of measurement, the Lexile metric provides a valuable, reliable point of reference as a measure for student growth (Briggs, 2013). Briggs analyzed the Lexile scale with regard to the framework of the theory of conjoint measurement, which allows researchers to quantify psychological attributes using measurable units. Findings revealed that scale of measure of the Lexile Framework is useful for creating criterion-referenced reading assessments to be used for diagnostic purposes. Briggs suggested that there is not a simple, one-size-fits-all, annual expected Lexile growth amount that all kids should meet each year, but rather that students grow more or less in their reading abilities depending on the stage of learning they are in at the time they are assessed. For example, early readers tend to make gains in Lexile scores at larger increments than experienced readers within a given year. Therefore, the Lexile scale is more appropriate for measuring growth in reading ability than for measuring reading ability as a static attribute.

The Reading Inventory Technical Guide (2014) corroborates the findings of Briggs (2013). Criterion-referenced tests like the Reading Comprehension Assessment are structured to reflect student achievement in comparison with standardized assessments and are unlike norm-referenced assessments because students are not compared with a sample group or to each other. Instead, students are measured according to their progress in meeting the standards aligned with the assessment (NSBA, 2006). According to *The Reading Inventory Technical Guide*, rather than establishing a norming group to compare participants with other students, the Reading Comprehension Assessment converts raw scores to corresponding Lexile scores so that the same Lexile metric that is used to measure texts is also used to measure readers so that readers and texts can be aligned using the same measurement metric within the Lexile Framework. According to the *Technical Guide* when a reader is aligned to a text using the student's Lexile score, the Lexile Framework predicts that the student will read the text with 75% comprehension such that if the student were to take an assessment with 100 comprehension questions, that student would answer 75 questions correctly. If the same student were to read a text that was 250L higher, then the student's predicted comprehension level would be reduced to 50%, and if the same student were to read a text 250L lower, then the student's predicted comprehension level would be increased to a rate of 90% comprehension (Scholastic, 2014). A student's Lexile score forecasts current comprehension level at the time of the assessment, the student's ability to pick up a text at a given level and understand it. However, though Lexile levels measure "semantic and syntactic complexity of texts," Lexiles are not directly aligned with reading grade levels because comprehension also depends on other variables such as students' background knowledge and ability to use a variety of reading comprehension strategies while they read.

Therefore, a student's Lexile score does not forecast or guarantee the student's ability to read and comprehend a text that is typical of a higher grade level. Scholastic provides a temperature analogy to illustrate this concept. Temperature is one of many variables that indicate the comfort level of a current climate conditions, but we do not discount its value. Along with current temperature we also consider the humidity, wind chill, and chance of precipitation when deciding what clothes to wear for the day. The Lexile Framework is similar in that it is one of many indicators that teachers can use when monitoring classroom conditions for students and planning instruction to meet student needs. The more significant benefit of the Lexile Framework is in using it to monitor student growth in reading comprehension over time and to use that knowledge of student growth to adjust instruction. Then, readers can begin to read more challenging texts, and as they read more challenging texts, their reading skills continue to flourish.

The nature of the adaptive structure of the Reading Comprehension Assessment is such that assessing reliability of this test requires a different methodology than could be used to assess reliability of a traditional, paper-based assessment for which all test takers would answer the same questions in the same format. According to the *Technical Guide* (2014) the item-response theory is used to calibrate test items because this theory "provides an index of reliability for an entire test that does not require all children to be administered the same exact items" (p. 100). Researchers compute the marginal reliability by "determining the proportion of test performance that is not due to error" by "subtracting the total variability in estimated ability by an error term, and dividing this difference by the total estimated ability" with a marginal reliability coefficient that is between 0.00 and 1.00 and that measures how much of a participant's test score reflects the participant's ability rather than other influential environmental factors. Scholastic researchers report that a marginal reliability over 0.80 suggests that reading test scores truly distinguish a participant's reading ability. This marginal reliability is also used equated to the model reliability, which "describes the upper bound of the 'true' reliability of person ordering and is dependent on sample ability variance, length of the test, number of categories per item, and sample-item targeting" (p. 100). In a study conducted by MetaMetrics of 3,488 students in the Texas San Antonio School District, researchers reported marginal reliability of 0.94, reflecting that the Reading Comprehension Assessment can rank students reliably; however, researchers recommended further empirical studies should be conducted to add to this body of research.

The 2014 *Technical Guide* also addresses content validity, criterion-related validity, and construct validity of the Reading Comprehension Assessment. With regard to content validity, test item passages are deemed developmentally appropriate for reading comprehension of students at respective grade level ranges, and the assessment contains a subset of "Hi-Lo" questions for students in secondary grades who read below grade level so that the questions are high interest and low difficulty in order for the reading content of the passages to be considered developmentally appropriate for secondary grades students. For example, it would not be developmentally appropriate for a student in ninth grade who has a low level of reading comprehension skills to read the same content as a student in second grade because, developmentally, ninth grade students typically have different interests from second grade students. In addition to measures taken to ensure that content of the assessment is developmentally appropriate for test takers, the questions on the assessment are structured to elicit text-based responses rather than responses that require students to make predictions or apply background knowledge of topics outside of the text to guess what the correct answers may be.

With regard to criterion-related validity the *Scholastic Technical Guide* provides data from multiple studies to reflect that there are positive relationships between reading intervention programs and Reading Comprehension Assessment scores in school systems in these studies using *READ 180* as a reading intervention program. Additionally, with regard to construct validity of the test in measuring the trait of reading ability, data from studies that compared Reading Comprehension Assessment data to other assessments also measuring reading comprehension indicate that the Reading Comprehension Assessment and the other assessments have construct validity in that they are measuring similar traits. These assessments include the Stanford Achievement Tests Ninth or Tenth Edition (SAT-9/10), Sunshine State Standards Test (SSS), and the Preliminary Scholastic Aptitude Test (PSAT), as well as the formerly used print version of the Reading Comprehension Assessment. Assessments that did not reflect a high correlation in measurement of construct were the Stanford Diagnostic Reading Test (SDRT-4) and the STAR Reading assessment.

Data Collection

I received Lexile score data from the 2015-2016 cohort of ninth grade students at Maryville Junior High School during the students' eighth and ninth grade school years. This dataset was used to address research questions 1 through 5. These scores were provided to me by the principal of Maryville Junior High School, Lisa McGinley. The scores were originally collected and disaggregated by the Maryville Junior High School librarian, Alicia Luttrell. These data included growth scores based on pre- and post scores from 2014-2015 for each student as well as growth scores based on pre- and post scores from 2015-2016 for each student. From these sources, I received Lexile score data from the 2015-2016 cohort of 10th grade students from when they attended eighth and ninth grade at Maryville Junior High School. This second dataset was used for comparison purposes in response to research question 6. The data collected for each student included the individual's

1. baseline reading Lexile for eighth grade
2. end-of-year reading Lexile for eighth grade
3. baseline reading Lexile for ninth grade
4. end-of-year reading Lexile for ninth grade
5. growth in Lexile score points from eighth grade quarter one to eighth grader quarter four (difference between end-of-year score and baseline score for each student)
6. growth in Lexile score points from ninth grade quarter one to ninth grade quarter four (difference between end-of-year score and baseline score for each student)
7. gender
8. free or reduced priced meal status

The compiled dataset was transferred into SPSS, and paired t-tests were completed to analyze the research questions and to make conjectures about the population and among subgroups (gender of students and free or reduced meal status of students).

Ethical and Legal Considerations

Ethical and legal considerations for this study have been carefully considered. According to McMillan and Schumacher (2010) ethics in research regard moral behavior in accession of data and engaging with study participants. They also caution researchers to be candid about the details of the study. Full disclosure about all aspects of the study were provided to the principal of Maryville Junior High School and the director of Maryville City Schools, including the purpose of the research, research methods, data analysis, and conclusions. Deception is not a necessary component of this research and was not used as a research tool. The educational research for this study including secondary data analysis of standardized test results was “unobtrusive” and presented minimal risks to the population of students who were studied.

Researchers must consider possible risks and take steps to reduce the risks or effects of such risks, although avoiding risks is critical and extreme consequences are atypical, some level of risk is probable. A potential risk for this study could occur if conclusions based on data analysis were to adversely represent the iReach initiative of Maryville City Schools. However, in the limitations section of Chapter 1 and in the data analysis section in Chapter 3 of this study, the researcher has recognized the possibility that the school district could experience an implementation dip, a decline in mean student growth, coinciding with initial implementation of the iReach initiative, which could possibly result from teachers and students acclimating to the changes in the learning environment. Fullan (2001) reassured leaders of change efforts that implementation dips in achievement are normal and occur as a result both of people learning new skills in order to acclimate to change and of people reacting with fear or anxiety in response to environmental changes they are facing. As this study involves data collected on the brink of and during implementation of a change initiative, any drop in student reading Lexiles could certainly be evidence of an implementation dip. Further research would then be necessary to monitor student growth after the initial implementation of iReach. At this point these data would not adversely affect the reputation of the school district as could a sustained drop over multiple years.

To protect privacy and confidentiality of participants, which is also a critical research step (McMillan & Schumacher, 2010), the researcher received redacted data with deleted names from datasets replacing participant names with numbers in order to organize data for subsequent analysis without linking data back to participants. Neither participant names nor any other identifying information were linked back to participants after initial data collection and redaction. In compliance with The Family Educational Rights and Privacy Act (FERPA) of 1974, the researcher used data from school records that are of “legitimate educational interest,” the reviewer analyzed typical test data that is collected from normally existing school programs, and no individual or personally identifiable data were reported (McMillan & Schumacher, 2010).

Data Analysis

This study used quasi-experimental quantitative methodology with secondary data analysis (McMillan & Schumacher, 2010). Data analysis was based on SRI Lexile scores collected from the 2015-2016 cohort of ninth grade students in Maryville City Schools. This dataset was used to measure Lexile growth from pre- and posttest scores during the 2014-2015 school year before the implementation of the iReach blended learning model and to measure Lexile growth from pre- and posttest scores during the 2015-2016 school year during the first year of the full implementation of the iReach blended learning model. The researcher conducted a series of paired t-tests to compare population means of samples and subgroups which may be correlated (“Paired,” 2016). To address Research Question 1the researcher conducted a paired t-test to determine if a significant difference exists between the growth scores of eighth grade students during the 2014-2015 school year and the growth scores of the same cohort of ninth grade students during the 2015-2016 school year with regard to students who were enrolled in Maryville City Schools both years. To address Research Questions 2, 3, and 4 subsequent paired t-tests were used to compare subgroups, including male, female, economically disadvantaged students, and noneconomically disadvantaged students. To address Research Question 6 the researcher conducted a paired t-test to determine if a significant difference exists between the growth scores of eighth grade students during the 2013-2014 school year and the growth scores of the same cohort of ninth grade students during the 2014-2015 school year with regard to students who were enrolled in Maryville City Schools both years. Then, the difference in mean growth scores between 2013-2014 and 2014-2015 for this cohort of students who received instruction in both grades before the implementation of iReach were compared to the difference in mean growth scores between 2014-2015 and 2015-2016 for the 2015-2016 cohort of ninth grade students who received ninth grade instruction during the first year of the iReach one-to-one blended learning initiative. To address Research Question 7 the researcher conducted a paired t-test to determine if a significant difference exists between the overall mean growth from eighth grade to ninth grade of the 2015-2016 freshman cohort and the 2015-2016 sophomore cohort. To address Research Question 8 the researcher conducted a two-way contingency table analysis to determine if the 2015-2016 freshmen cohort or sophomore cohort shows significantly higher or lower frequency of eighth to ninth grade increases or decreases in reading Lexile growth than expected. The two variables were cohort of students with two levels (2015-2016 freshman cohort and 2015-2016 sophomore cohort) and reading Lexile status with two levels (decrease and increase). All statistical analysis was conducted using the Statistical Program for the Social Sciences (SPSS) Windows Version 20 with the alpha level 0.05 (Green & Salkind, 2011).

Chapter Summary

To compare student reading Lexile growth data collected through the use of the SRI Reading Comprehension Assessment to determine if there was a correlation between the implementation of iReach and reading Lexile growth in Maryville City Schools, I have chosen quasi-experimental quantitative methodology with secondary data analysis because there is a body of literacy achievement data available for eighth and ninth grade students in Maryville City Schools collected via the SRI College & Career Reading Comprehension Assessment subtest. These achievement data can be used to analyze student reading Lexile growth during eighth grade in comparison to student reading Lexile growth in ninth grade (for the same cohort of students), which could be a key indicator in the progress of literacy development for the 2015-2016 cohort of Maryville ninth grade students because, in the same 2015-2016 school year, they are also experiencing the first year of the district-wide implementation of iReach, the Maryville City Schools blended learning model.

This study is quasi-experimental because there is no random assignment of subjects, and it used secondary data analysis because I have access to the reading Lexile data that have been gathered by Maryville City Schools (McMillan & Shumacher, 2010). The quantitative data available through the Reading Comprehension Assessment results during the 2014-2015 and 2015-2016 school years provided one snapshot of student achievement at a time when students in the school district were experiencing great change in their learning environment. The use of a paired t-test to analyze this quantifiable data on the same cohort of students during this pivotal time of change for the district provided insight into whether or not significant differences exist between the growth scores of eighth grade students during the 2014-2015 school year and the growth scores of the same cohort of ninth grade students during the 2015-2016 school year with regard to students who were enrolled in Maryville City Schools both years ("Paired," 2016). These data, in conjunction with data from the 2014-2015 ninth grade cohort that attended both eighth and ninth grade before the full implementation of iReach, helped to determine if there is a significant difference in growth between the cohort that experienced the change from traditional instruction to the iReach blended learning model and the cohort that experienced traditional instruction throughout both eighth and ninth grades.

CHAPTER 4

FINDINGS

This ex post facto quasi-experimental quantitative study was conducted to compare student reading Lexile growth data collected through the use of the Scholastic Reading Inventory (SRI) College & Career Reading Comprehension Assessment subtest before and after iReach implementation to determine if there was a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools. The Reading Comprehension Assessment dataset used in this study serves as one district-wide indicator of student achievement in grades 8 and 9 as the district undergoes changes during the implementation of iReach.

Results

Tests in response to the following research questions were used to examine the differences that exist in reading Lexile growth of the study participants and the number of participants who achieved reading Lexile growth as they passed through eighth and ninth grades in Maryville City Schools.

Research Question 1

Is there a significant difference between the reading Lexile growth scores of eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2015-2016 school year

$H_0 1$: There is no significant difference between the reading Lexile growth scores of eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of the same cohort of students in ninth grade during the 2015-2016 school year.

A paired-samples *t* test was conducted to determine if there is a significant difference between the reading Lexile growth of eighth grade students during the 2014-2015 school year and the reading Lexile growth of the scores of the same cohort of ninth grade students. Mean reading Lexile growth was the test variable, and the grouping variable was the grade level during which the students were tested. The test was significant, $t(366) = 5.40$, $p < .01$. Therefore, the null hypothesis was rejected. This cohort experienced significantly higher reading Lexile growth during eighth grade ($M = 92.53$, $SD = 109.54$) than during ninth grade ($M = 53.20$, $SD = 80.91$). The 95% confidence interval for the mean difference between the two scores was 25.01 and 53.65. The standardized effect size index, *d*, was .28, which indicated a small effect size with considerable overlap in distributions. Students in this cohort tended to experience significantly more reading growth during eighth grade than during ninth grade. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 1 shows the distributions for the reading Lexile scores of students during their eighth and ninth grade school years.

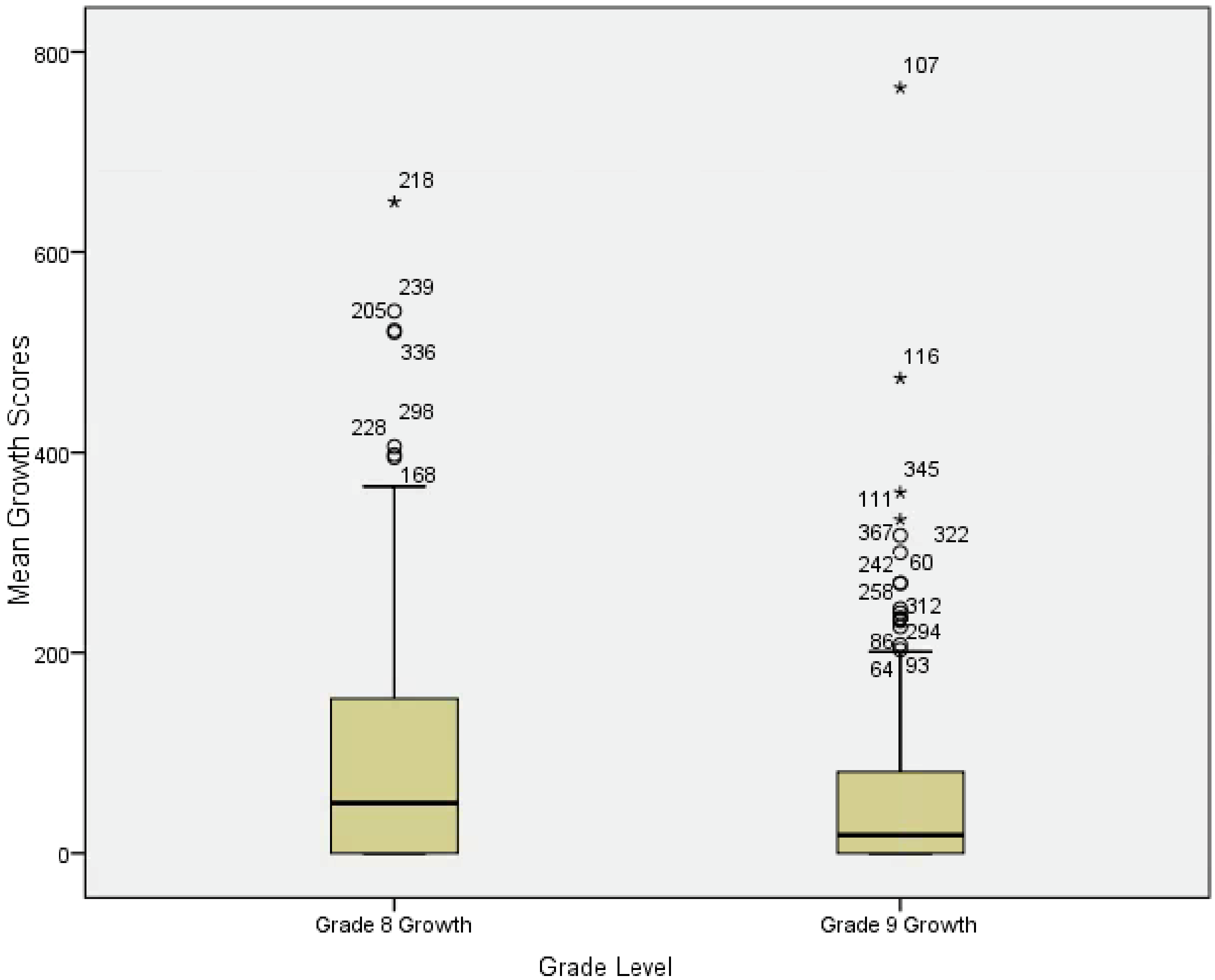

Figure 1. Reading Lexile Growth for 2015-2016 Freshman Cohort during Grades 8 and 9.

Research Question 2

Is there a significant difference between the reading Lexile growth scores of male eighth grade students during the 2014-2015 school year and the growth scores of male students of the same cohort of ninth grade students during the 2015-2016 school year?

H_o2: There is no significant difference between the reading Lexile growth scores of male eighth grade students during the 2014-2015 school year and the growth scores of male students of the same cohort of students in ninth grade during the 2015-2016 school year.

A paired-samples *t* test was conducted to determine if there is a significant difference between the reading Lexile growth of male eighth grade students during the 2014-2015 school year and the reading Lexile growth of the same cohort of male ninth grade students. Mean reading Lexile growth was the test variable, and the grouping variable was the grade level during which the students were tested. The test was significant, $t(183) = 3.38$, $p < .01$. Therefore, the null hypothesis was rejected. This cohort experienced significantly higher reading Lexile growth during eighth grade ($M = 95.31$, $SD = 116.79$) than during ninth grade ($M = 57.22$, $SD = 94.930$). The 95% confidence interval for the mean difference between the two scores was 15.83 and 60.35. The standardized effect size index, *d*, was .25, which indicated a small effect size with considerable overlap in distributions. Students in this cohort tended to experience significantly more reading growth during eighth grade than during ninth grade. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 2 shows the distributions for the reading Lexile scores of these male students during their eighth and ninth grade school years.

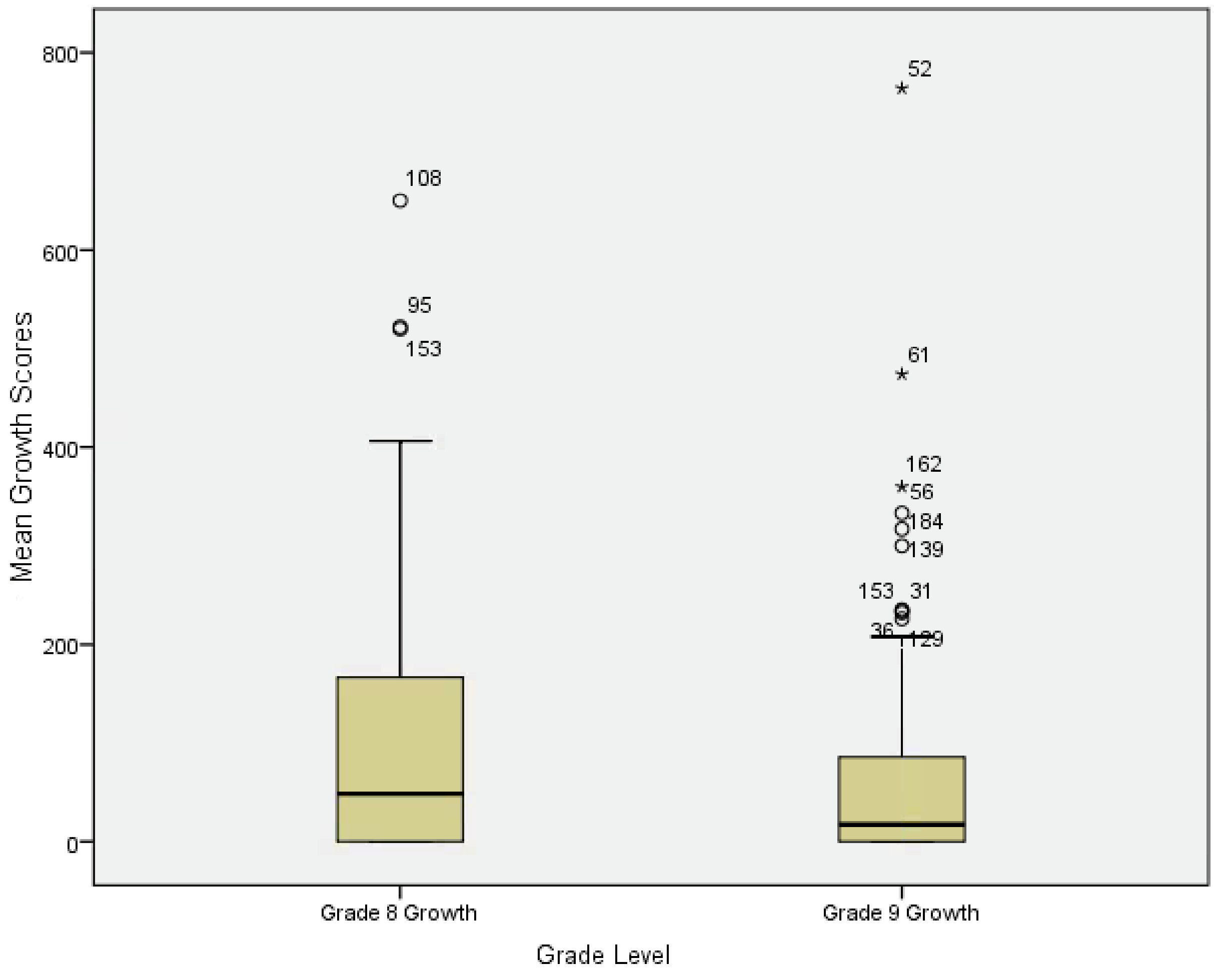

Figure 2. Reading Lexile Growth for 2015-2016 Male Freshman Cohort during Grades 8 and 9.

Research Question 3

Is there a significant difference between the reading Lexile growth scores of female eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of female students of the same cohort of ninth grade students during the 2015-2016 school year?

H_o3: There is no significant difference between the reading Lexile growth scores of female eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of female students of the same cohort of students in ninth grade during the 2015-2016 school year.

A paired-samples *t* test was conducted to determine if there is a significant difference between the reading Lexile growth of female eighth grade students during the 2014-2015 school year and the reading Lexile growth of the same cohort of female ninth grade students. Mean reading Lexile growth was the test variable, and the grouping variable was the grade level during which the students were tested. The test was significant, $t(182) = 4.40$, $p < .01$. Therefore, the null hypothesis was rejected. This cohort experienced significantly higher reading Lexile growth during eighth grade ($M = 89.74$, $SD = 101.98$) than during ninth grade ($M = 49.16$ $SD = 63.79$). The 95% confidence interval for the mean difference between the two scores was 22.37 and 58.79. The standardized effect size index, *d*, was .33, which indicated a small effect size with considerable overlap in distributions. Students in this cohort tended to experience significantly more reading growth during eighth grade than during ninth grade. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 3 shows the distributions for the reading Lexile scores of students during their eighth and ninth grade school years.

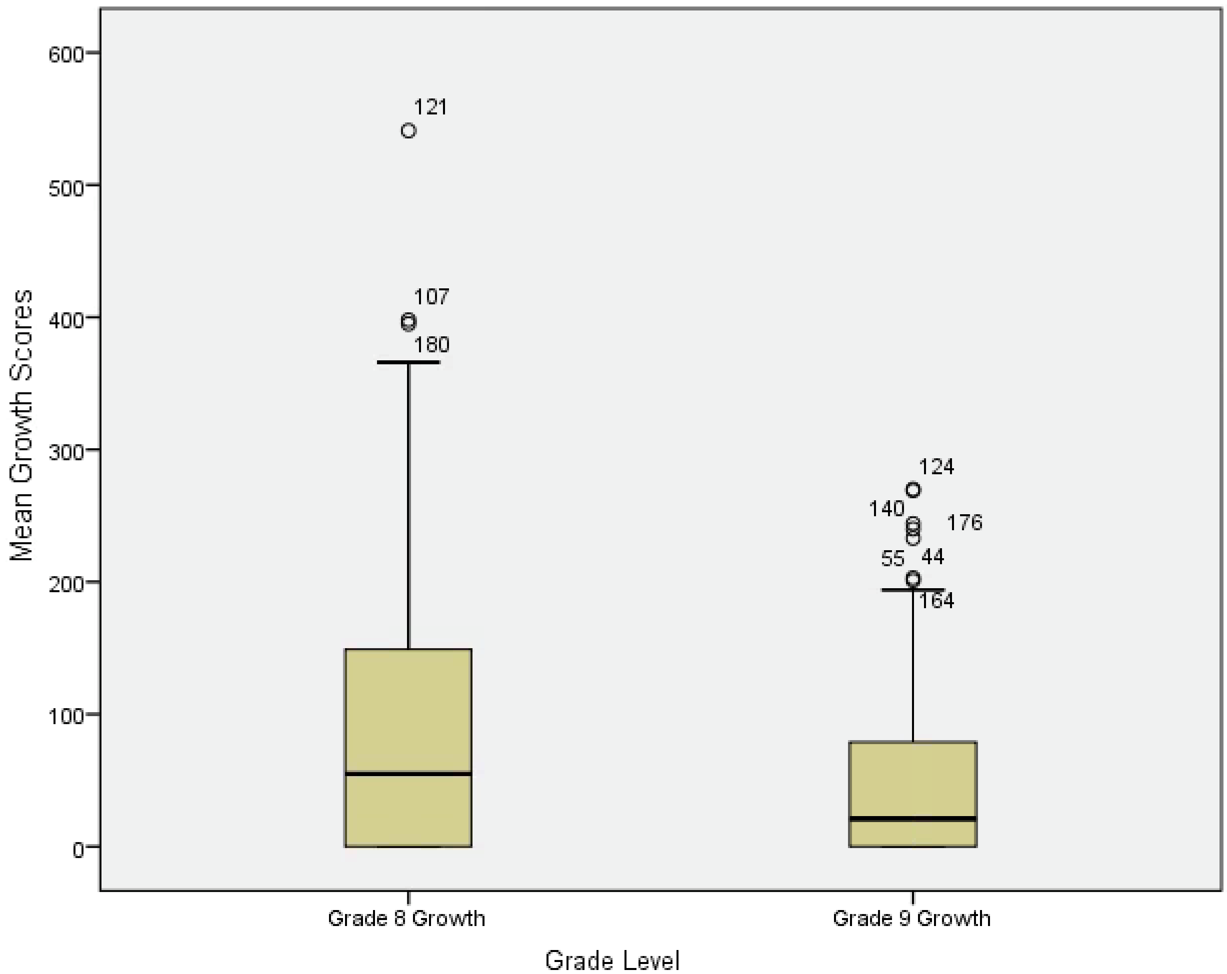

Figure 3. Reading Lexile Growth for 2015-2016 Female Freshman Cohort during Grades 8 and 9.

Research Question 4

Is there a significant difference between the reading Lexile growth scores of economically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of economically disadvantaged ninth grade students of the same cohort during the 2015-2016 school year with regard to students who were enrolled in Maryville City Schools both years?

H_o4: There is no significant difference between the reading Lexile growth scores of economically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of economically disadvantaged students of the same cohort of students in ninth grade during the 2015-2016 school year.

A paired-samples *t* test was conducted to determine if there is a significant difference between the reading Lexile growth scores of economically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of economically disadvantaged ninth grade students of the same cohort. Mean reading Lexile growth was the test variable, and the grouping variable was the grade level during which the students were tested. The test was significant, $t(76) = 4.41$, $p < .01$. Therefore, the null hypothesis was rejected. This cohort experienced significantly higher reading Lexile growth during eighth grade ($M = 98.66$, $SD = 118.54$) than during ninth grade ($M = 36.23$, $SD = 55.85$). The 95% confidence interval for the mean difference between the two scores was 34.20 and 90.66. The standardized effect size index, *d*, was .50, which indicated a medium effect size with some overlap in distributions. Students in this cohort tended to experience significantly more reading growth during eighth grade than during ninth grade. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 4 shows the distributions for the reading Lexile scores of students during their eighth and ninth grade school years.

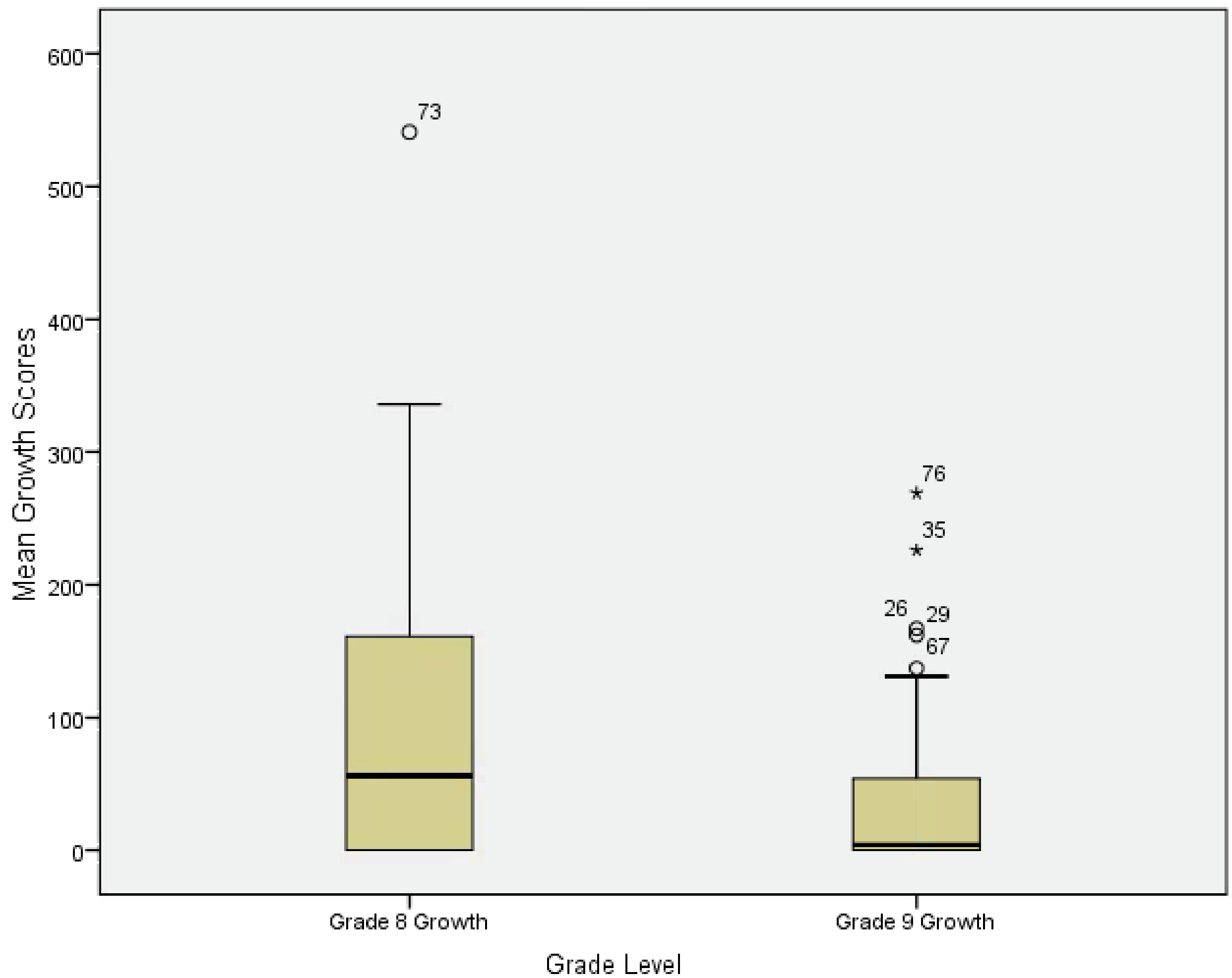

Figure 4. Reading Lexile Growth for 2015-2016 Economically Disadvantaged Freshman Cohort during Grades 8 and 9.

Research Question 5

Is there a significant difference between the reading Lexile growth scores of noneconomically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of noneconomically disadvantaged ninth grade students of the same cohort during the 2015-2016 school year?

H_o5: There is no significant difference between the reading Lexile growth scores of noneconomically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of noneconomically disadvantaged students of the same cohort of students in ninth grade during the 2015-2016 school year.

A paired-samples *t* test was conducted to determine if there is a significant difference between the reading Lexile growth scores of noneconomically disadvantaged eighth grade students during the 2014-2015 school year and the reading Lexile growth scores of noneconomically disadvantaged ninth grade students of the same cohort. Mean reading Lexile growth was the test variable, and the grouping variable was the grade level during which the students were tested. The test was significant, $t(289) = 3.96$, $p < .01$. Therefore, the null hypothesis was rejected. This cohort experienced significantly higher reading Lexile growth during eighth grade ($M = 90.91$, $SD = 107.18$) than during ninth grade ($M = 57.71$, $SD = 85.86$). The 95% confidence interval for the mean difference between the two scores was 16.69 and 49.71. The standardized effect size index, *d*, was .23, which indicated a small effect size with considerable overlap in distributions. Students in this cohort tended to experience significantly more reading growth during eighth grade than during ninth grade. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 5 shows the distributions for the reading Lexile scores of students during their eighth and ninth grade school years.

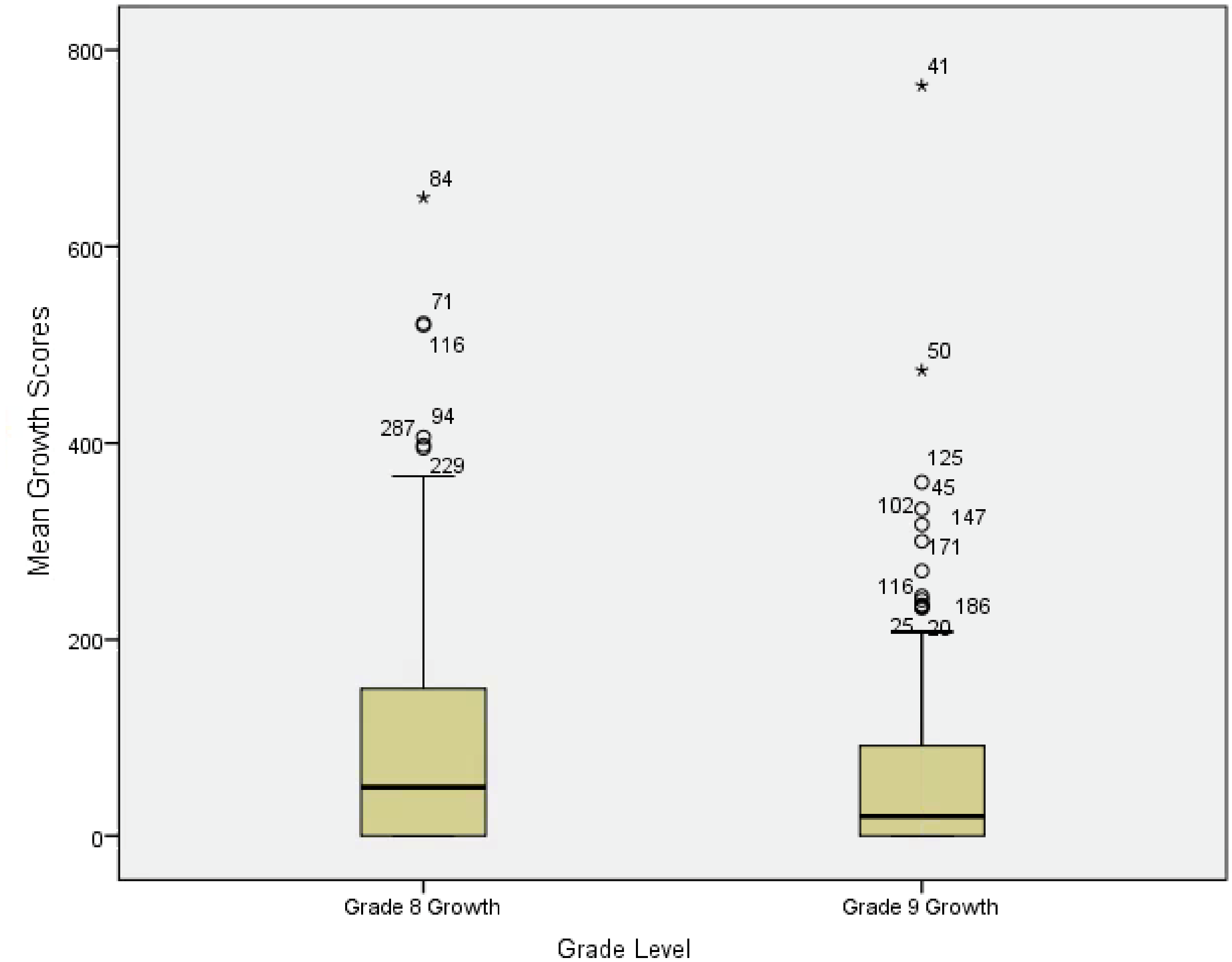

Figure 5. Reading Lexile Growth for 2015-2016 Noneconomically Disadvantaged Freshman Cohort during Grades 8 and 9.

Research Question 6

Is there a significant difference between the reading Lexile growth scores of eighth grade students during the 2013-2014 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2014-2015 school year?

H_o6: There is no significant difference between the reading Lexile growth scores of eighth grade students during the 2013-2014 school year and the reading Lexile growth scores of the same cohort of ninth grade students during the 2014-2015 school year.

A paired-samples *t* test was conducted to determine if there is a significant difference between the reading Lexile growth scores of eighth grade students during the 2013-2014 school year and the reading Lexile growth scores of the same cohort. Mean reading Lexile growth was the test variable, and the grouping variable was the grade level during which the students were tested. The test was significant, $t(367) = 1.79$, $p = .07$. Therefore, the null hypothesis was rejected. This cohort experienced significantly higher reading Lexile growth during eighth grade ($M = 95.16$, $SD = 98.62$) than during ninth grade ($M = 78.90$, $SD = 135.50$). The 95% confidence interval for the mean difference between the two scores was -1.59 and 34.12. The standardized effect size index, *d*, was .09, which indicated a small effect size with considerable overlap in distributions. Students in this cohort tended to experience significantly more reading growth during eighth grade than during ninth grade. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 6 shows the distributions for the reading Lexile scores of students during their eighth and ninth grade school years.

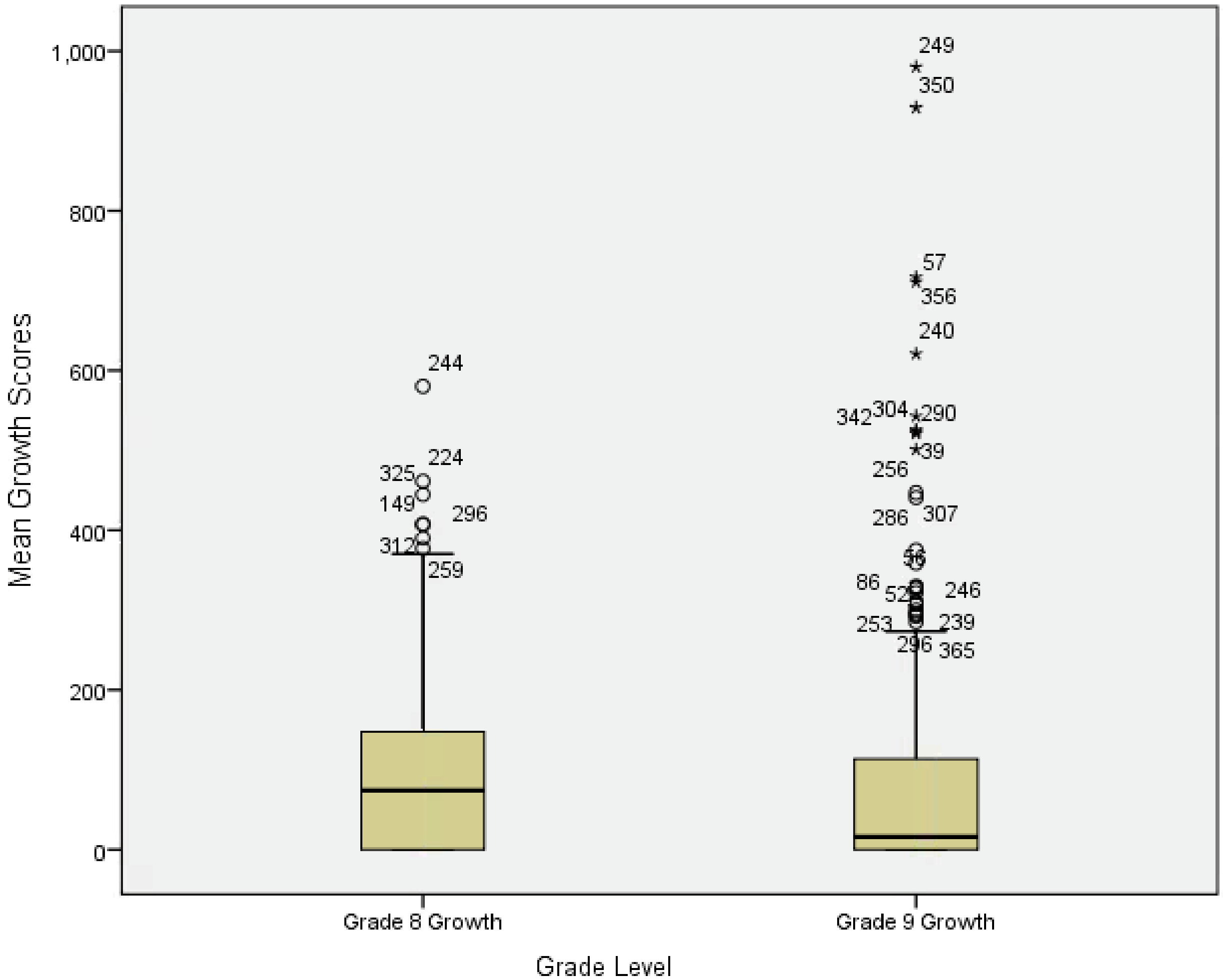

Figure 6. Reading Lexile Growth for 2015-2016 Sophomore Cohort during Grades 8 and 9.

Research Question 7

Is there a significant difference between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort?

H_o7: There is no significant difference between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort?

An independent-samples *t* test was conducted to evaluate the hypothesis that there is no significant difference between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort. Mean reading Lexile growth was the test variable, and the grouping variable was the freshman or sophomore cohort. The test was not significant, $t(733) = .12$, $p = .91$. Therefore, the null hypothesis was retained. The standardized effect size index, *d*, was .01, which indicated a small effect size with considerable overlap in distributions for the reading Lexile growth of students in each cohort. Students in the freshman cohort ($M = 144.71$, $SD = 143.16$) tended to experience a similar amount of growth in scores as the students in the sophomore cohort ($M = 143.41$, $SD = 157.60$). The 95% confidence interval for the difference in means was -20.51 to 23.11. Note the data are skewed because there were more students who experienced increases rather than those who did not experience growth, and there were a considerable number of outliers as indicated by numbered small circles on the figure. Figure 7 shows the distributions for the two cohorts.

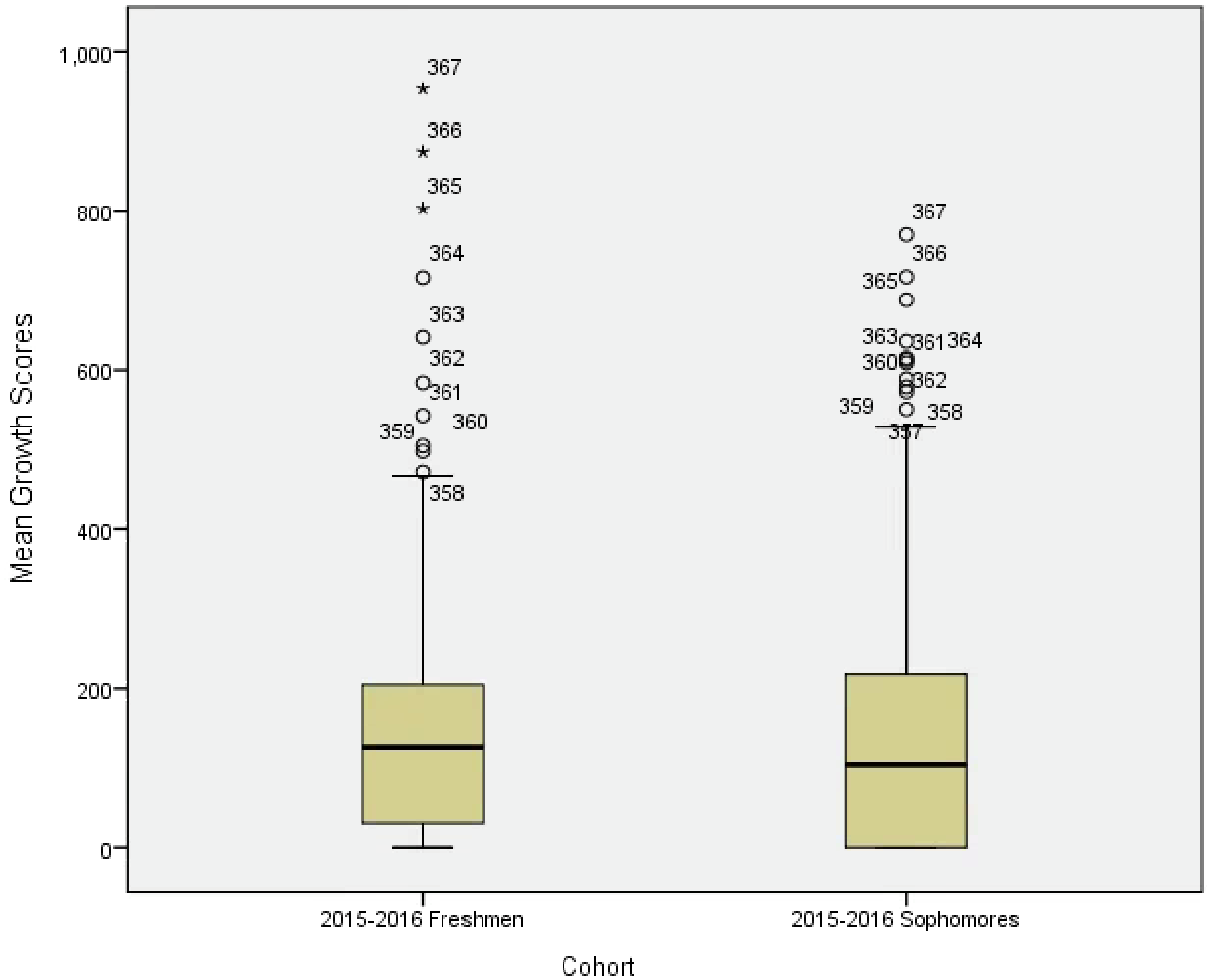

Figure 7. Total Reading Lexile Growth from eighth Grade Pretest to ninth Grade Posttest.

Research Question 8

Is there a significant difference between the rates of eighth to ninth grade reading Lexile growth of the freshman and sophomore cohorts?

H_o8: There is not a significant difference between the rates of eighth to ninth grade reading Lexile growth of the freshman and sophomore cohorts.

A two-way contingency table analysis was conducted to determine if the 2015-2016 freshmen cohort or sophomore cohort shows significantly higher or lower frequency of eighth to ninth grade increases or decreases in reading Lexile growth than expected. The two variables were cohort of students with two levels (2015-2016 freshman cohort and 2015-2016 sophomore cohort) and reading Lexile status with two levels (decrease and increase). The cohort of students and status of students' reading Lexiles were found to be significantly related, Pearson χ^2 (1, N = 735) = 5.46, p = .02, Cramér's V = .08. Therefore, the null hypothesis is rejected. The proportions of reading Lexile increases that occurred for the freshman and sophomore cohorts were .80 and .73 respectively. In general, the freshman cohort experienced a significantly higher frequency of increases in reading Lexile growth than expected, and the sophomore cohort experienced significantly lower frequency of increases in reading Lexile growth than expected. Figure 8 displays the proportions of reading Lexile increases and decreases per each cohort.

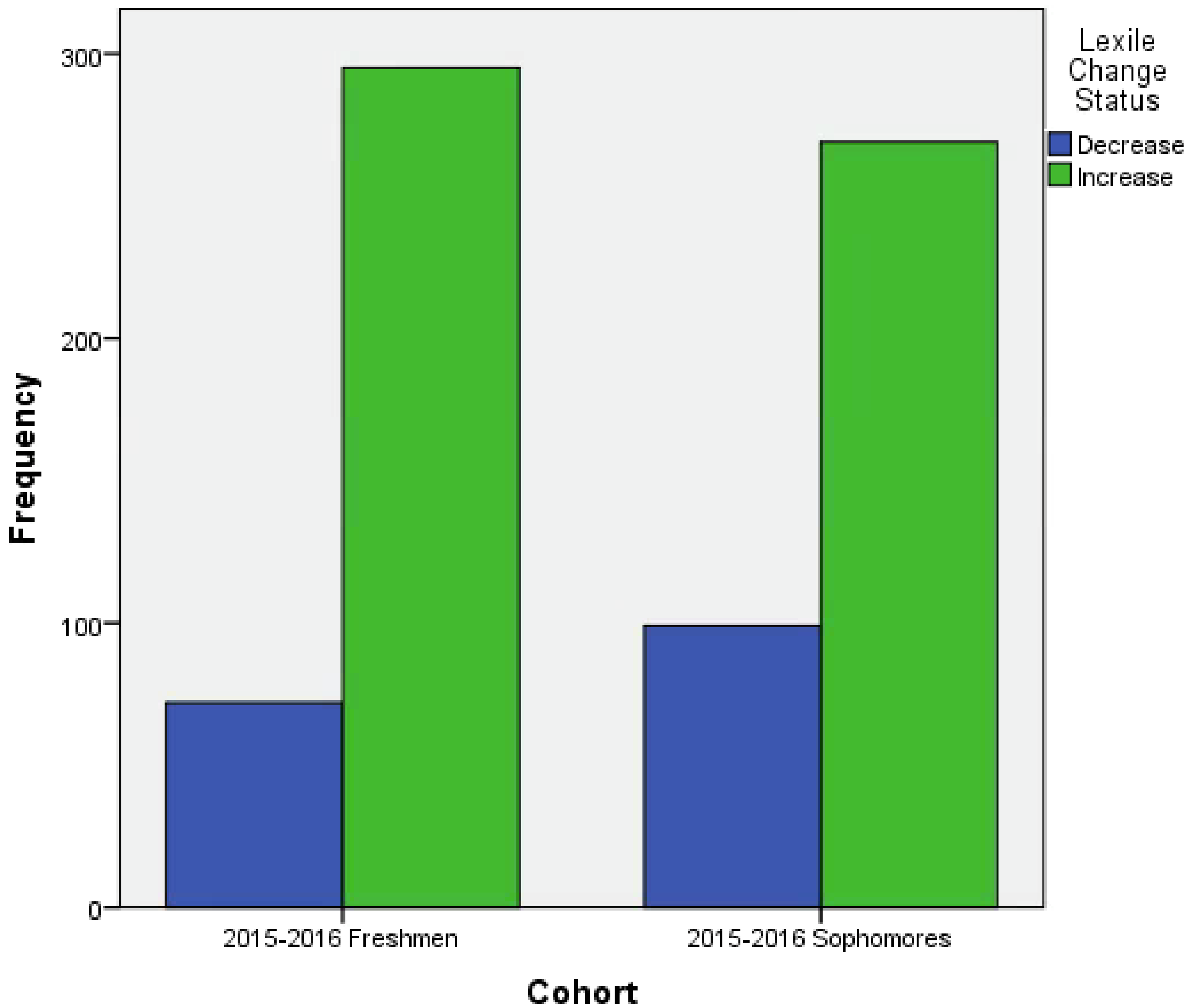

Figure 8. Reading Lexile Changes from eighth Grade Pretest to ninth Grade Posttest among 2015-2016 Freshman and Sophomore Cohorts.

Chapter Summary

This ex post facto quasi-experimental quantitative study was conducted to compare student reading Lexile growth data collected through the use of the Scholastic Reading Inventory (SRI) College & Career Reading Comprehension Assessment subtest before and after iReach implementation to determine if there was a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools. The Reading Comprehension

Assessment data used in this study serves as one district-wide indicator of student achievement in grades 8 and 9 as the district undergoes changes during the implementation of iReach.

Research questions 1 through 5 probed the assessment data collected from the 2015-2016 freshman cohort by focusing on the cohort as a whole as well as subgroups (males, females, economically disadvantaged, and noneconomically disadvantaged). Results for the entire freshman cohort and each subgroup demonstrated significantly greater reading Lexile score growth during the eighth grade year before the school system implemented the iReach blended learning initiative than during ninth grade, the first full year of iReach implementation.

Research question 6 explored the reading Lexile assessment data collected from the 2015-2016 sophomore cohort before the full implementation of the iReach blended learning initiative. Results for the entire sophomore cohort demonstrated significantly greater reading Lexile score growth during the eighth grade year than during the ninth grade year.

Research questions 7 and 8 explored reading Lexile assessment data collected from both the 2015-2016 freshman and sophomore cohorts. Results demonstrated that no significant difference existed between the reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the scores of students in the 2015-2016 sophomore cohort such that the freshmen tended to experience a similar amount of growth in scores as the sophomores. However, the freshmen experienced a significantly higher frequency of reading Lexile score increases than expected from eighth to ninth grade while the sophomores experienced a significantly lower frequency of reading Lexile score increases than expected from eighth to ninth grade.

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

This ex post facto quasi-experimental quantitative study was conducted to compare student reading Lexile growth data collected through the use of the Scholastic Reading Inventory (SRI) College & Career Reading Comprehension Assessment subtest before and after iReach implementation to determine if there was a correlation between the implementation of iReach and reading Lexile growth of students in Maryville City Schools. The Reading Comprehension Assessment data analyzed for this study serves as one district-wide indicator of student achievement in grades eight and nine as the district undergoes change during the implementation of iReach. Data analysis reflects a need for further research to establish more conclusive results on the impact of MCS iReach implementation on student reading Lexile growth and its implications for best practices in blended learning, reading instruction, and reading assessment.

Discussion and Conclusions

If the 2015-2016 cohort of ninth grade students experienced a drop in reading Lexile growth during the first year of full iReach implementation in relation to the growth experienced by the same cohort prior to full iReach implementation, then it could have suggested that students experienced a lag in reading skills acquisition as they acclimated to changes in their learning environment in relation to iReach implementation or other change. Such implementation dips are common during times of change (Fullan, 2001). On the contrary, if the 2015-2016 cohort of ninth grade students experienced an increase in reading Lexile growth during the first year of full iReach implementation in relation to the growth experienced prior to full iReach implementation, then it could have suggested that students experienced a boost in reading skills acquisition as a result of changes in their learning environment in relation to iReach implementation or other change. If the 2015-2016 cohort of ninth grade students experienced the same pattern of growth as the 2014-2015 cohort of ninth grade students, then it could have suggested that the iReach implementation had neither positively nor adversely affected the students' reading comprehension skills.

Although it can only provide a snapshot of progress for grades 8 and 9 students during the initial implementation of iReach, the body of data elicited by the Reading Comprehension Assessment can serve as a critical guidepost for district administrators to monitor progress and make deliberate adjustments as needed in response to the data indicators.

Research questions 1 through 5 examine the assessment data collected from the 2015-2016 freshman cohort with regard to the cohort as a whole as well as subgroups (males, females, economically disadvantaged, and noneconomically disadvantaged). Results for the entire freshman cohort and each subgroup demonstrate significantly greater reading Lexile score growth during the eighth grade year before the school system implemented the iReach blended learning initiative than during ninth grade, the first full year of iReach implementation. These findings suggest that the implementation of iReach is not the sole factor affecting reading Lexile growth for students because, if it were, the students would have experienced more growth on average during ninth grade than during eighth grade. External factors that may have affect the variability in amount of growth that occurred during each grade level could include differences in teachers, instructional philosophies, instructional practices, curriculum, and cognitive development of adolescents. The ninth grade drop in average amount of score increases for this cohort could also suggest that teachers and students may have experienced an implementation dip (Fullan, 2001) as a result of acclimating to the first year of a newly adapted system-wide blended learning environment; however, results of 2015-2016 sophomore cohort data allay this concern because the sophomore cohort experienced a similar pattern of growth during the sophomores' eighth and ninth grade school years suggesting that the significant differences that exist between mean growth scores of eighth graders and mean growth scores of ninth graders is also typical of students who have not experienced instruction with the iReach blended learning model.

Research question 6 explores the reading Lexile assessment data collected from the 2015-2016 sophomore cohort before the full implementation of the iReach blended learning initiative. Results for the entire sophomore cohort demonstrate significantly greater reading Lexile score growth during the eighth grade year than during the ninth grade year. In comparison, results from question 5 data analysis reflect a similar pattern of growth for the ninth grade cohort. These results considered together indicate that a reading Lexile growth pattern exists among eighth and ninth graders in Maryville City Schools. This pattern may be a result of a combination of factors including but not limited to variation in teachers, instructional philosophies, instructional practices, curriculum, and cognitive development of adolescents but likely with little regard to implementation of iReach because the sophomore cohort scores for both eighth and ninth grade school years were collected before the implementation of iReach. These findings regarding eighth and ninth grade reading Lexile growth patterns also corroborate contemporary research (Briggs, 2013) on the Reading Comprehension Assessment with regard to findings that early readers tend to make larger gains in Lexile scores than more experienced readers within a given time frame such that the average amount of students' growth in reading Lexile scores naturally decreases incrementally as they mature similarly to how a person's rate of physical growth in height is expected to decline in the stage between early childhood to adolescence and then again even to a halt at some point between adolescence and adulthood.

Research questions 7 and 8 analyzed reading Lexile assessment data collected from both the 2015-2016 freshman and sophomore cohorts. Results demonstrate that no significant difference exists between the average reading Lexile growth scores from eighth to ninth grade of students in the 2015-2016 freshman cohort and the average growth scores of students in the 2015-2016 sophomore cohort such that the freshmen tend to have experienced a similar amount of growth in scores as the sophomores. However, the freshmen experienced a significantly higher frequency of reading Lexile score increases than expected from eighth grade pretest to ninth grade posttest while the sophomores experienced a significantly lower frequency of reading Lexile score increases than expected from eighth grade pretest to ninth grade posttest. Therefore, although no significant difference exists in the average amount of growth from eighth grade pretest to ninth grade posttest experienced by these two cohorts, the freshmen cohort has a significantly higher frequency of students than expected who have increased their reading Lexile scores from eighth grade pretest to ninth grade posttest than the expected frequency of students in the sophomore cohort who have increased their scores. These significant findings indicate that some variable or combination of variables have worked better for the freshman cohort and have attributed to the higher than expected frequency of students whose scores have increased. These variables could include the implementation of the iReach blended learning initiative, differences in teachers, instructional philosophies, instructional practices, curriculum, and cognitive development of adolescents.

Implications for Practice

Average reading Lexile growth was significantly higher during eighth grade than ninth grade for both cohorts of students as well as for all subgroups of the freshman cohort. Therefore, professional collaboration between eighth and ninth grade teachers among and across curriculum content areas is recommended. Collaborative efforts to develop blended learning instructional practices that address all areas of the TPACK framework (Koehler & Mishra, 2009) may enhance learning outcomes for students as they progress through both grade levels.

Students in the freshman cohort experienced a higher than expected frequency of increases in reading Lexile scores; whereas, students in the sophomore cohort experienced a lower than expected frequency of increases in reading Lexile scores. Therefore, Maryville City Schools should continue implementing iReach because it is possible that iReach has contributed to the difference in the significantly higher than expected number of freshman students who have increased their reading Lexile scores. Other districts should explore this blended learning model as well to determine how it could be adapted to meet student needs within their school communities.

District and school administrators significantly impact the efficacy of blended learning initiatives (Chewning, 2015; Metlife, 2012). The Maryville City Schools leadership team at the district and school levels should continue supporting teachers in their implementation of blended learning practices and contributing to school culture that is conducive to productive blended learning practices. Maryville City Schools should also host visits from leaders in other school districts who are interested in supporting teachers in implementing similar practices within their own school districts.

Implications for Future Research

The iReach blended learning model was in its initial year of full implementation when datasets for this study were collected; therefore, research on the impact of iReach is limited. Further research needs to be conducted to add to this body of research. This study related to student literacy skills and iReach. Further research is recommended to shed light on the relationship between student numeracy skills and iReach. Because a similar eighth and ninth grade reading Lexile growth pattern was detected for both the freshman and sophomore cohorts in this study, further investigation of growth patterns of eighth and ninth grade students are recommended both within Maryville City Schools and in comparison with other school districts to determine if patterns are similar on average among all eighth and ninth grade students in districts with and without the use of blended learning. If there is a pattern among eighth and ninth grade students, reading Lexile growth patterns among upper and lower grade levels may exist as well. Further research is recommended in Maryville City Schools and in comparison to other school districts both to extend this body of research to upper and lower grade levels and to gain a broader perspective of growth patterns and frequencies of reading Lexile growth among students in all grade levels. Further research is also recommended to compare reading Lexile growth of students experiencing iReach blended learning model to reading Lexile growth of students experiencing blended learning models of other school districts.

Chapter Summary

Results of paired-samples t tests of eighth and ninth grade reading Lexile growth scores for the entire 2015-2016 freshman cohort, subgroups of the freshman cohort (male, female, economically disadvantaged, and noneconomically disadvantaged), and the entire 2015-2016 sophomore cohort demonstrated significantly greater reading Lexile score growth during the eighth grade year before the school system implemented the iReach blended learning initiative than during the ninth grade, the first full year of iReach implementation. These results suggest that the implementation of iReach is not a sole factor in increasing the reading Lexile growth for students. These findings regarding eighth and ninth grade reading Lexile growth patterns also corroborate contemporary research (Briggs, 2013) on the Reading Comprehension Assessment with regard to findings that early readers tend to make larger gains in Lexile scores than more experienced readers within a given time frame such that the amount of students' growth in reading Lexile scores naturally decreases incrementally as they mature.

Although there was no significant difference detected in the average amount of growth experienced by these two cohorts, the freshmen cohort had a significantly higher frequency of students than expected who increased their reading Lexile scores in relation to the sophomores who had a significantly lower frequency of students than expected who increased their reading Lexile scores. These findings indicate that some variable or combination of variables worked better for the freshman cohort and attributed to the higher than expected frequency of students whose scores increased.

Various outside factors that may have affected the variability in amount of reading Lexile growth and the frequency of students who experienced reading Lexile growth. These factors may include the implementation of the iReach blended learning initiative and differences in teachers, instructional philosophies, instructional practices, curriculum, cognitive development of adolescents, and other variables. Therefore, no conclusive evidence exists to indicate that the implementation of iReach increases student reading Lexile growth; however, findings do indicate that significantly more freshman students than expected tended to experience reading Lexile growth during the initial year of iReach implementation than those students who have passed through ninth grade before iReach was implemented. This phenomenon could be a result of iReach implementation or related variables.

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Dean's List