Learning Targets Instructional Strategy and Missouri Assessment Program Scores in Communication Arts and Mathematics.

Kathryn A. Anderson

B.S., Central Missouri State University, 1987
M.S., Central Missouri State University, 1995

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Russell Kokoruda, Ed.D.
Major Advisor

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Verneda Edwards, Ed.D.

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James Robins, Ed.D.

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Abstract

This study investigated the impact the implementation of the learning targets instructional strategy (LTIS) had on student achievement in communication arts and mathematics, as measured by the Missouri Assessment Program (MAP) test. The research design for the current study was quantitative and used archival state assessment data to follow the progress of three cohort groups of students over three school years in a small, rural Missouri school. The sample size included 25 students beginning in 4^{th}, 5^{th}, and 6^{th} grades, and ending in 6^{th}, 7^{th}, and 8^{th} grades, respectively.

Baseline data were collected for the 2011-2012 school year, prior to the implementation of the LTIS, and compared to 2012-2013, after one year of exposure to the LTIS, and 2013-2014 MAP data, after two years of exposure to the LTIS. Three research questions were formulated to help determine the extent to which students' communication arts (CA) and mathematics (math) achievement changed over time after students were exposed to the LTIS. JASP statistical software was used to conduct three, two-way repeated measures ANOVAs.

In general, after experiencing some implementation dips, results indicated that all three cohorts improved their MAP scores in at least one subject area by the end of the second year of exposure to the LTIS strategy. Specifically, Cohorts One and Three exhibited largely mixed results where students increased in one subject area and decreased in the other. Cohort Two was the only student group to make statistically significant progress over a two-year period implementation period of the LTIS.

Dedication

This dissertation is dedicated to the many students who struggle with learning essential concepts in communication arts and mathematics. I am dedicated to finding new and better ways to deliver instructional content to drive learning forward and helping students to gain the knowledge and skills necessary to lead happy and successful lives. I truly believe that all students are entitled to a high-quality education regardless of their gender, race, socioeconomic status, or even by their handicapping conditions. I will work tirelessly and to the best of my ability to ensure that our school uses its time, talent, and resources to deliver the best education our district's dollars can provide.

I further dedicate this dissertation to the administration and school board members of my district who entrusted me with the data to evaluate a new strategy implemented to bolster student achievement. It is my hope that students will continue to experience academic success long past the completion of the current study. As we continue to work together, it is my fervent hope that we will continue to refine our methods of presentation, instruction, and use of data to drive learning forward.

Finally, I dedicate this dissertation to my fellow educators, for we are committed to a paradigm in which the sum of the parts is truly greater than the whole, and the future success of our students, our nation, and our world begins in our collective classrooms.

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Chapter One

Introduction

In the United States, teachers are tasked with the challenge of teaching all students to master academic content that emphasizes core reading and mathematics skills, regardless of their diverse range of abilities, backgrounds, or socioeconomic status. The National Institute for Literacy (2007; 2009) stated that developing proficient readers at an early age is critical to students' long-term success and the foundation for mastering key communication arts (CA) skills. The National Council of Teachers of Mathematics (NCTM) (2013) specified that building an early understanding of mathematics provides the foundation for further school success. NCTM stated that early elementary students should be presented with challenging and rigorous learning experiences through effective, goal-oriented, and research-based teaching strategies. Moore, Garst, and Marzano (2015) observed that opinions on effective learning strategies vary greatly from one school district to another. Questioning teachers as to their opinions of the most effective teaching strategies implemented in their classrooms yielded only their personal theories or preferences, based on what worked well for that individual teacher (Moss & Brookhart, 2012). The No Child Left Behind (NCLB) (USDE, 2002) legislation required that teachers implement strategies that were researched-based and proven to be effective, and that student outcomes be monitored with high-stakes assessments in CA and mathematics. The law known as NCLB impacted how teachers were to plan, implement, and assess the strategies used to impart students with core curricular skills.

Hattie, (2009) and DuFour and Marzano, (2011) believed that teachers who provided students with learning targets and relevant, timely feedback helped them to reach high state standards. The learning target is the central idea or key component on which students need to focus during daily lessons to master the overarching content standard (Moss & Brookhart, 2012). Stiggins, Arter, Chappuis, and Chappuis, (2009) determined that learning targets helped teachers present the lesson in an outcome-based format, and stated that when such targets were posted in student-friendly terms, or in “I can” statements, they could effectively guide student learning. The LTIS encompasses many of Hattie’s (2009) visible learning techniques. To make learning visible, he recommended presenting students with a daily posted learning target, providing students with direct and timely feedback, using multiple forms of assessments, including formative, self, and summative assessments to modify and drive instruction, and basing instructional decisions on assessment data. These researched-based components helped educators modify and refine the daily learning targets in order to help students reach stringent district and state standards (Moss & Brookhart, 2012). Effectively implementing learning targets may help close the educational gap between what students know and what they still need to learn, to meet state and district standards (Hattie, 2013).

Background

The current study was conducted in District X, a small, rural district in Missouri. Due to its high number of low- socioeconomic status students, District X qualified for school-wide Title I classification in 2005 (A. R., personal communication, February 8, 2017). District X consists of only one actual school, which is a K-8 facility. On 2016, official student count day in Missouri, total district enrollment was 89 students (A. R., personal communication, February 9, 2017). Of this population, 92.5% were classified as economically disadvantaged, 14.6% received special education services, and no English language learners were identified. White was the largest subgroup, reported at 93.8%, and Black was the only student subgroup, reported at 6.2% (A. R., personal communication, February 9, 2017). In 2016, the district employed twelve certified teachers, who taught several combined grade-level classes to meet students' instructional needs. District X also employed six classified staff members and one administrator, who served as both principal and superintendent. In accordance with NCLB (USDE, 2002; 2009) guidelines, all teachers and administrators in District X met the criteria to be highly qualified, possessed two or more years teaching experience, and were certified in the areas they were teaching (A. R., personal communication, February 9, 2017).

Prior to the 2008-2009 school year, students in District X had performed at or slightly above state standards and had met annual yearly progress (AYP) standards for more than three consecutive years (J. D., personal communication, February 9, 2017). As part of the school improvement plan in District X, the administrators and board members decided to implement a school-wide research-based initiative, referred to in the current study as the LTIS, to improve students' MAP scores in CA and mathematics (J. D., personal communication, February 9, 2017). For District X, the LTIS consisted of five basic components, including visibly posting the expected student learning target, making sure students understood what they were to be learning, employing multiple types of student feedback, using assessment data to modify the next learning targets, and connecting the learning targets to the predominant district and state standards. District X teachers created performance scales to establish talking points for student and teacher reflection, and to discuss Moss and Brookhart's (2012) essential questions: 1) What did the students learn from this lesson, and 2) What evidence is there to support this conclusion? Students could actively participate in rigorous activities that deepened their understanding of the learning target, updated their performance scales, gauged what they were able to do, and adjusted their responses accordingly (Moss & Brookhart, 2012). To assist them in this process and ensure program implementation fidelity, a staff-based curriculum coach was employed to help all teachers across all grades and core content areas.

Statement of the Problem

Students' overall MAP assessment scores in District X showed a three-year gradual decline in the areas of CA and math from the 2008-2009 school year to the 2010-2011 school year, requiring the district to take action to increase student performances (A. R., personal communication, July 28, 2016). District X students' MAP scores in CA and math were also reported to be below state and local criteria to meet annual yearly progress (A. R., personal communication, July 28, 2016). These percentages indicated that District X students exhibited a gradual decline in mastering key concepts in CA and math. NCLB (USDE, 2002) guidelines stated that schools were being held to a higher academic standard and were accountable for ensuring that all students are presented with rigorous coursework resulting in increased academic outcomes.

To meet this standard, District X teachers participated in a year-long professional development program during the 2011-2012 school year to learn how to incorporate Moss, Brookhart, and Long's (2011) LTIS. Specifically, District X teachers were trained by the Central Regional Professional Development Center staff to use five specific elements of the LTIS, which included: 1) visibly posting the expected student outcomes for the day's lesson; 2) checking for students' understanding of expected outcomes; 3) providing a variety of timely and relevant forms of feedback for student work; 4) evaluating and using assessment data to monitor progress towards mastering the learning target and to modify instruction; and 5) connecting the daily learning targets to larger district goals and state standards.

Learning targets could make a difference in raising overall academic achievement (Hattie 2009, 2013; Moore, Garst, & Marzano, 2015). In compliance to NCLB (USDE, 2002) and to address these academic deficiencies, District X incorporated the learning targets instructional strategy (LTIS) into the teaching and learning process during the 2012-2013 school year to support learning and increase students' MAP scores. After two years of implementation, the teachers in District X needed to determine whether or not the LTIS had made a difference in students' academic achievement in CA and math.

Purpose of the Study

The purpose of the current study was to determine if integrating the learning targets instructional strategy made a difference in fourth through eighth-grade students' communication arts and mathematics achievement as measured by the Missouri Assessment Program (MAP) test scores.

Significance of the Study

The current study could contribute to the growing body of research on the use of the learning targets instructional strategy (LTIS) and its effect on student performance. The specific method of incorporating the LTIS into the teaching presentation of the lesson gained momentum in recent years, but more information would be valuable to evaluate the effect of the LTIS upon rural students in a small group setting. Data from the current study could also help educators and administrators of small, rural schools in the development of their schools' instructional approach.

Delimitations

Lunenburg and Irby, (2008), stated that delimitations are those limitations controlled by the researcher, stating that they are, "self-imposed boundaries set by the researcher on the purpose and scope of the study" (p. 134). The following delimitations were acknowledged by the researcher for the current study.

1) The study focused only on one small rural school's implementation of the learning targets instructional strategy.
2) This study collected data generated from the 2011-2012, 2012-2013, and 2013-2014 calendar school years.
3) The effectiveness of the learning targets instructional strategy was evaluated using communication arts and mathematics data generated from the Missouri Assessment Tests, taken by all 4th through 8th-grade students at the end of the of the 2012-2013 and 2013-2014 school years.

Assumptions

Assumptions can be defined as, "…postulates, premises, and propositions that are accepted as operations for the purpose of research" (Lunenburg & Irby, 2008, p. 135).

- It was assumed that the teachers in the District X implemented the learning targets instructional strategy with fidelity.
- It was assumed that students were given ample opportunity to master the concepts covered throughout courses in which daily learning targets were used.
- It was assumed that teachers provided adequate opportunities for formative, peer and self-evaluation activities as part of the goal-setting process.
- It was assumed that students did their best on the MAP tests administered at the end each school year.

Research Questions

The following research questions were developed to see if integrating the learning targets instructional strategy into the teaching and learning process had an effect on fourth through eighth-grade students, and if it caused a difference in their communication arts and mathematics MAP achievement test scores.

RQ1. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (4th, 5th, 6th) and curriculum type (CA and math) for Cohort One, during the implementation of the learning targets instructional strategy? ($\alpha = .05$).

RQ2. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels

(5^{th}, 6^{th}, 7^{th}) and curriculum type (CA and math) for Cohort Two, during the implementation of the learning targets instructional strategy? ($\alpha = .05$).

RQ3. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (6^{th}, 7^{th}, 8^{th}) and curriculum type (CA and math) for Cohort Three, during the implementation of the learning targets instructional strategy? ($\alpha = .05$).

Definition of Terms

The terms used throughout the course of the current study are defined to provide a basis for clarity so that the research may be accurately understood and interpreted (Lunenburg & Irby, 2008).

Adequate Yearly Progress (AYP). Adequate Yearly Progress (AYP) is defined by the United States No Child Left Behind Act as a measurement which allows the U.S. Department of Education to accurately determine the academic progress of all public schools and school districts in the country, as monitored by state standardized tests (United States Department of Education, 2009).

Assessment-capable learner. An assessment-capable learner is a student who understands a lesson's learning target and can accurately describe his or her progress toward achieving the goal in relation to the criteria and uses that information to modify their personal learning approach to improve their performance (Hattie, 2009).

Clozentropy. Clozentropy is a testing strategy commonly included in many state testing formats whereby significant words are systematically left out of a sentence to test students' English proficiency **(**Marzano, 2007).

Feedback. Feedback specifically refers to the information communicated between "the teacher [and students] about what students can and cannot do," so that specific instruction may be provided to improve the student's level of understanding and quality of work (Hattie, 2009, p. 4).

Formative Assessment. Formative assessment is the systematic process whereby the teacher continuously assesses students' progress in learning new information or acquiring new academic skills as presented by lessons or individual units of study (Marzano, 2007).

Instructional Objectives. An instructional objective "describes an intended outcome and the nature of the evidence that will determine mastery of that outcome from a teacher's point of view. It contains content outcomes, conditions, and criteria" (Moss & Brookhart, 2012, p. 164).

Instructional Strategy. A teaching technique implemented by classroom teachers that have been proven to increase student achievement (Moore, Garst, & Marzano, 2015).

Instructional Technique. A teaching method used to increase students' depth of knowledge and skills (Moore, Garst, & Marzano, 2015).

Learning Target. A learning target states what is to be learned in the day's lesson, the desired student outcome of the lesson, and what type evidence will be used to determine the mastery of the learning target. (Moss & Brookhart, 2012).

Missouri Assessment Program (MAP). The Missouri Assessment Program (MAP) is a mandatory end-of-year set of standardized tests taken annually by all students in grade three and above in Missouri; it is designed to measure student performance against the Missouri Learning Standards (Department of Higher Education, 2016).

Monitoring. The act of checking for evidence of the success of a desired result or outcome during the time the strategy is being implemented (Moore, Garst, & Marzano, 2915).

Peer assessment. An assessment practice where learners review, consider, and evaluate the assignments or tests of another equal-status learner, based on a teacher's benchmarks or rubric, to provide immediate formative or summative feedback to a peer (Topping, 2009).

Performance Scales. Performance scales are a continuum that outlines and articulates the knowledge and skills relative to the district's content and curricular standards (Moore, Garst, & Marzano, 2015).

Scaffolding. Scaffolding refers to the various ways in which teachers help students acquire metacognition designed to gradually and steadily increase rigor to improve students' depth and breadth of knowledge (Joyce, Weil, & Calhoun, 2009).

Student Learning Outcomes (SLO). The accumulation of what students should know and the skills they should be able to do that are developed and deepened through a specific course of study (Marzano, 2007).

Summative Assessment. Summative assessment is the practice of evaluating a student's demonstrated knowledge at the end of a course of study or learning experience, such as the end of a semester or school year (Marzano, 2007).

Organization of the Study

The current study was divided into five chapters. The first chapter discussed the rationale for the current study, as well as the purpose, the research questions, and definitions of the key terms utilized throughout the study. Chapter two, a review of the literature, highlights the legislative change agents in the educational paradigm leading up to the need to incorporate researched-based instructional strategies to increase academic achievement among American students. The chapter also includes relevant information on landmark educational legislation, guidance, and standards such as USDE's No Child Left Behind ([NCLB] 2002, 2011), the Common Core State Standards (2015), and Every Student Succeeds Act of 2015 (USDE, 2016). It concludes with a detailed description of the learning targets instructional strategy (LTIS) and a summary of the research on the use of that strategy. Chapter three identifies the specific research design and methodology used in the current study to collect and analyze the generated data; discussed the instrumentation and methods of data collection; and identifies the types of statistical analysis used in this research study. Chapter four presents an analysis of the collected data and related findings. Finally, a summary of the study's conclusions, implications, and recommendations for future studies is provided in chapter five.

Chapter Two

Review of the Literature

The purpose of the current study was to analyze the effect that the implementation of the learning targets instructional strategy (LTIS) had upon the communication arts (CA) and mathematics (math) skills of 4^{th} through 6^{th}-grade students, and determine if the LTIS significantly affected students' proficiencies in math and CA areas, as measured by the Missouri Assessment Program (MAP) test. This chapter presents a review of the literature regarding the use of the LTIS to enhance student learning in CA and mathematics. This review begins with a focus on the 1983 report of the National Commission on Excellence in Education entitled, *A Nation at Risk*, submitted to President Ronald Reagan, detailing American students' declining academic achievement, and leading to some major changes to the ways in which children are taught.

Educational Legislation

A Nation at Risk. A report from The National Commission on Excellence in Education ([NCEE],1983) to the Secretary of Education, T. H. Bell entitled, "*A Nation at Risk*," asserted that, " the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people" (Sec. 1, para. 1). The report claimed that among 15-year-olds, nearly all other Westernized countries developed students who performed significantly better than American students in mathematics, science and literacy skills (NCEE, 1983). Furthermore, the report stated that among 17-year-olds in the United States, nearly half lacked higher order thinking skills, and nearly 40% of minority youth were reported to be functionally illiterate, as evidenced by a skills deficit in elementary mathematics, reading, and writing tasks (Forgoine, 1983). This report called for a nationwide reform in education, boldly stating that "…regardless of race or class or economic status, students are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost" (NCEE, 1983, sec.2., para. 5).

More than three decades later, in its 2015 report to the USDE, The National Center for Educational Statistics (NCES, 2015) claimed that among 17-year-olds, American students' scores in reading and mathematics had not significantly changed between 1970 and 2012. Kozol (1992), Wagner, (2008) and Kena et al. (2015) discussed the continued need for drastic changes to the ways in which American students are educated to be competitive in an increasingly global society. In response to these claims, NCLB (2002) and the Common Core State Standards Initiative (2015) initiated an increased demand for more rigorous educational standards. At the state level, the Missouri Department of Elementary and Secondary Education (MDESE, 2011) supported legislative actions to hold students, and ultimately school districts, accountable to a higher level of performance. MDESE (2011, 2013) noted that in many Missouri schools, over the past five years, student achievement scores had fallen well below the national average in the critical areas of math, science, and CA.

The National Reading Panel. In 1997, the first congressional order was issued which required schools to analyze the research behind reading strategies and further determined which methods yielded the most successful outcomes for students (Shanahan, 2006). Following that early legislative action, in 2000, the National Reading Panel (NRP) completed a review of reading strategies to help teachers which involved more than 205 studies on teaching reading and comprehension (Shanahan, 2009). Shanahan

(2009) stated that NRP reviewed 45 studies on vocabulary teaching and 16 on oral reading fluency, regarding student comprehension outcomes. Additionally, the National and NRP considered the findings from research that covered 52 phonemic awareness studies and 38 phonics studies, focusing primarily on comprehension outcomes (Institute of Child Health and Human Services, 2000; Shanahan, 2009). Despite students' level of fluency, Shanahan's research showed that although these students could respond to high-level comprehension questions, they still struggled with questions requiring critical thinking or problem-solving skills. While fluent readers were able to achieve average to above average scores in basic comprehension and remembering or interpreting textual information, many students still struggled to use text information to complete tasks requiring higher-order thinking skills. Shanahan (2009) concluded that using fluency strategies alone would not guarantee that students would understand the text, or how to apply it in meaningful ways.

National Assessment of Educational Progress in Mathematics. The results of the National Assessment of Educational Progress (NAEP) presented a broad overview of 4^{th} and 8^{th} students' mathematical skills (Vanneman, Hamilton, Anderson, & Rhaman, 2009). States and districts are ranked according to their yearly assessment scores, which reportedly exhibit what students know and can do in mathematics. NAEP (2015) measured students' problem-solving skill across a variety of mathematical areas and reported that approximately 139,900 4^{th}-grade students and 136,900 8^{th}-grade students participated in their study. According to the National Center for Education Statistics (NCES, 2015), while scores remained relatively constant for most racial subgroups, scores significantly decreased for subgroups including females, Whites, students in rural areas, and small towns.

According to the Nation's Report Card (MDESE, 2016d, 2017; [NCES], 2015), both 4th and 8th-grade students scored lower in mathematics in 2013 than was reported in 2015 (NAEP, 2015). Significant disparities were noted in both reading and mathematics achievement, at similar rates, between different groups of students such as rural students, racial subgroups, and those of low socioeconomic status (NAEP, 2015). Statistics such as the aforementioned provided further impetus for the need for systemic changes to the educational status quo and was particularly germane to the current study.

No Child Left Behind. On January 8, 2002, President George W. Bush signed the No Child Left Behind (NCLB) legislation into law, creating sweeping changes to the ways in which all K-12 schools receiving public funding would deliver services to students (U.S. Department of Education [USDE], 2002). The USDE (2002) stated that NCLB's purpose was to make certain that, "all children have a fair, equal, and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging state academic achievement standards and state academic assessments" (SEC. 1001, para. 1). This purpose would be achieved through twelve principles that underpinned the legislation. Principles that were particularly germane to the current study included ensuring that districts employed highly qualified teachers; better meeting the needs of impoverished or disadvantaged children; closing the achievement gap between students of different socioeconomic statuses; holding schools to a higher level of accountability for student achievement; increasing achievement and content standards;

and promoting research-based instructional strategies (USDE, 2002, 2009; MDESE, 2015b).

This law mandated that school administrators make intense efforts to improve students' annual yearly progress (AYP); moreover, a school failing to meet AYP faced becoming unaccredited, which was tied to even greater sanctions (Lee, 2016). This legislation included bold language that Lee stated was intended to provide aid to districts with concentrated numbers of low-income schools. Less affluent districts could apply for Title I status, which would be beneficial, because it would provide districts with additional funding, spending flexibility, and incentivization dollars to encourage schools to strive harder to meet AYP guidelines (Lee, 2016). The USDE (2002) stated that the revised law gave schools greater flexibility in determining how they could spend federal dollars, provided they could prove that students showed adequate growth and improvement in reading and mathematics.

These tough new standards were intended to force schools to improve instructional practices and provide remedial or intervention services for struggling students, including those in special education (Lee, 2016). To meet AYP, schools had to test at least 95% of their students in all subgroups, including students living in poverty, minorities, and those receiving special education services. Schools were also subjected to harsh penalties for poor student performance, which included the firing of staff, loss of crucial funding, state reorganization of the district, or even the closure of the school itself (Lee, 2016). NCLB (USDE, 2016) served as the mainstay of school governance from 2000 to 2015. According to the USDE (2016), all students were required to meet proficiency guidelines set by this legislation, as well as individual state guidelines in CA and math. NCLB (USDE, 2009, 2011) revisions mandated the use of research-based instructional strategies to improve student achievement and paved the way for a gradual, systemic shift in many school districts. Incorporating strategies such as Hattie's (2009) visible learning strategies, and Moss and Brookhart's (2012) learning targets, Moore, Garst, and Marzano (2015) believed students would make greater academic gains because teachers and students would be focused on learning specific skills and use relevant feedback to monitor and modify their progress.

C**ommon Core State Standards.** The purpose of the Common Core State Standards Initiative (CCSS, 2015a, 2016) was to ensure that all students at all grade levels and across all state lines mastered content materials to a minimum level of mastery. The Missouri Department of Elementary and Secondary Education (MDESE, 2011) clarified that the CCSS assured that all students enrolled in the public school system were learning the same age and grade-appropriate materials, thereby adding a crucial element of continuity to the educational system. MDESE (2009) stated that the CCSS established the academic knowledge and skill sets students should master by the end of each grade level, across all states, so that all students were adequately prepared for the next level of learning. The CCSS increased or enhanced many of the standards originally in place in Missouri according to MDESE (2014), by updating or replacing many previous standards and grade level expectations (GLE's) in CA and math.

The CCSS (2016b) added incentive programs that directly addressed achievement gaps in CAA and math by developing assertive policy reform measures. McGuinn (2011) noted that these reforms were aimed at efforts that attempted to raise both schools' accountability and the level of CA and math skills for all American students. One of the principal contributions of CCSS was the demand for the use of researched-based learning strategies in CA and math instruction, and to contribute to increased academic outcomes for students (Phillips, 2011).

Every Student Succeeds Act. NCLB (Lee, 2016) was a revised version of the Elementary and Secondary Education Act (ESEA). The USDE (2011) explained that NCLB was aimed at increasing schools' level of accountability and would implement harsh sanctions for districts with underperforming students. It is common for laws to be changed and updated every few years, and NCLB was no exception. NCLB was replaced by Every Student Succeeds Act (ESSA) in 2015. When ESSA passed, it served as a reauthorization of the Elementary and Secondary Education Act, long regarded as the nation's primary education law, reinforcing the nation's commitment to an equitable education for all students. The intent of the new legislation was to build upon the progress made by NCLB, as it continued to uphold accountability; however; ESSA added additional flexibility for parents whose children were enrolled in underperforming or unaccredited schools could choose to send their children elsewhere at their home district's expense (USDE, 2016). ESSA also upheld the fundamental principles of conducting annual statewide assessments, incorporating student performance targets, the practice of school ratings, accountability, and state interventions for underperforming districts, and the mandatory retention of highly qualified teachers (USDE, 2016).

In addition to these statutes, the new ESSA legislation added provisions to ensure students were college and career ready by graduation, supported high-quality preschool experience for all children regardless of income, upheld critical protections and provisions for disadvantaged and underprivileged children, incorporated evidence-based interventions to support academic success, and held students accountable for reaching high academic standards (MDESE, 2016a; USDE, 2016). In contrast to NCLB, the new act returned responsibility to the states for holding schools accountable for academic progress and for deciding on the most effective ways to help districts showing consecutive years of declining student achievement. According to MDESE (2016b), ESSA prescribed the parameters for state accountability systems but gave states the added flexibility to design individual methods of evaluation to best meet students' needs.

Researched-Based Instructional Strategies

The CCSS (2016c) mandated major shifts in the model of instruction in the communication arts (CA) calling for the inclusion of more complex, non-fiction, and multicultural text structures in literature. In math, CCSS (2016b) mandated more rigorous mathematical processes, including all areas of abstract concepts, calculation of algebraic and geometry equations in the younger grades, and the ability to calculate, analyze, and synthesize graphic illustrations (MDESE, 2016c). These stringent guidelines reflected the more rigorous standards parallel to other highly successful schools in both the United States and abroad. Also, they were designed to incorporate the knowledge and skills students would need for school success and beyond (MDESE, 2016b, 2016c). Students who lacked critical skills in reading, writing, and math skills would be crippled by this deficiency, further widening the already existing achievement gap between students of low socioeconomic statuses and their more affluent peers (Haycock, 2005; Zimmerman, 2012). Many researched-based methods of instruction began to be implemented into schools across the United States, in order to drive students to obtain higher achievement scores in CA and math (Rosenshine, 2012). Therefore, students should be taught these initial skills in a manner that helps them successfully engage in the learning process (Gorski, 2013). While American students appeared to receive a sufficient amount of math instructional time, the problem was in the way the instruction itself was delivered (Lloyd, 2016). This led to a belief that American teachers should approach teaching mathematics from a different angle than simply a drill and practice protocol (Lloyd, 2016).

Direct Instruction. The direct instructional approach involves teaching a specific skill in any content area, in a highly-structured classroom setting, and incorporating clear, direct, or scripted language for each lesson. When using direct instruction (DI), Marzano (2007) stated that the teacher focuses on creating specific learning outcomes by clearly identifying the expectations for learning, iterating important skills and concepts; provides detailed instructions; and connects new concepts to those previously learned. Hattie (2009) studied the effects of DI, synthesizing the results of multiple meta-analyses of several factors found to affect student achievement. Hattie found that DI was associated with a high effect-size, and was a statistically significant instructional strategy. He analyzed four meta-analyses and examined DI, across 304 studies, 597 effect-sizes, and over 42,000 students. Hattie concluded that DI yielded an average effect-size of 0.59, with results that generalized at .99 for both special and regular education students.

Przychodzin-Havis, Marchand-Martella, Martella, and Azim (2004) researched DI in conjunction with corrective or remedial mathematics instruction, in helping early learners to make connections in math concepts. Specifically, they compared twelve studies that focused on classrooms in which the DI method was the primary approach to teaching with seven other classes using other math instructional methods, and found that eleven of the twelve classes using the DI approach yielded statistically significant results in student achievement. Przychodzin-Havis et al., (2005) analyzed the results of 28 longitudinal studies in the efficacy of using DI as the primary method for reading intervention. Of those, 24 studies examined the success of "Corrective Reading" in the regular class setting, and four centered on using DI in the special education setting. They found statistically positive results in 26 of the 28 studies for students instructed using the DI method for corrective or remedial reading.

Coles (2003) and Krashen (2004) both evaluated DI’s effect on reading and found that it could lead to more negative attitudes towards reading and even to poorer writing outcomes. Krashen (2004) stated that strategies which were more open-ended, such as free voluntary reading, whole language, and child-centered reading activities, had an overall positive effect on young children’s attitudes in reading. Moreover, Cole (2003) observed that narrow and short-term educational gains did not always generalize into broad and long-term educational successes. Finally, Gopnik (2011) noted that DI study results were controversial at best because he maintained that a discovery approach to learning any new subject inspired curiosity and interest. He observed that using DI put students in a passive rather than an active role as a learner, causing them to be less interested, more teacher-dependent, and less motived to learn (Gopnik, 2011).

Differentiated Instruction. Students vary in culture, socioeconomic status, language, gender, motivation, ability/disability, personal interests and more, and teachers must be aware of these differences as they plan curriculum (DuFour & Marzano, 2011). By considering varied learning needs in all content areas, Tomlinson (2008) iterated that teachers could develop personalized instruction so that all children in the classroom can learn effectively. Tomlinson stated that differentiated instruction could be effectively used in any classroom setting and across all content areas, as it required only that teachers respond to a variety of student readiness levels, and take into consideration their students' needs, interests, and learning styles. While the learning target is geared toward the entire class and is the road map to where all students must end up so they will be successful, Moore, Garst, and Marzano (2015) stated that differentiation can set different expectations for differing types of task completion, based on students' individual needs. Tomlinson (2008) also believed that differentiation was the process of the teacher understanding more than just what students need to know and be able to do; teachers must also understand how students learn and demonstrate mastery of what they have already learned. This is a crucial step in differentiation, as only after this realization can the teacher match the learning activity to the student's readiness level to promote an individualized approach to the teaching and learning model (Tomlinson, 2008). Regarding the modification of a learning target, Tomlinson (2008) explained that successful teachers differentiated instruction throughout the presentation, course and content materials, consideration of individual learning styles, and modification of the physical classroom environment. He reinforced the idea that teachers should conduct continuous pre-and posttest assessments to provide critical feedback in evaluating the progress towards the learning target, so that teacher and learner may make adjustments to maximize student success.

Reciprocal Teaching. The Institute of Education Sciences (IES, 2010) defined reciprocal teaching as an interactive instructional practice used in teaching CA classes to improve students' reading comprehension skills. IES reported that this strategy helps students gain textual understanding when the teacher and students take turns reading and discussing specific segments of the text, using four comprehension strategies, including questioning, summarizing, clarifying, and predicting particular passages of the text. To begin the reciprocal teaching process, the teacher initially models the desired behavior, and the students then reciprocate by discussing with the teacher how each is related to the text. As students become adept with the strategy, they gradually assume a lead role in the discussion process, and the teacher functions as a discussion guide (IES, 2010). Hattie (2013) noted that the use of feedback is an essential component in the reciprocal process.

IES (2010) conducted six studies of reciprocal teaching in improving adolescent literacy and comprehension skills. Researchers selected 316 student participants in 4th-12th grades from several schools throughout the United States and Canada who met the criteria to be included in the study. The results were inconclusive, as they yielded mixed results. Of the six studies conducted across the comprehension domain, one showed statistically significant positive effects, two presented marginally positive effects, two exhibited unspecified effects, and one showed marginally negative effects (IES, 2010). Despite the mixed study results, researchers concluded that reciprocal teaching could still be an effective strategy in any subject, but was largely dependent upon the teacher's ability to communicate the strategy effectively, followed by continuously monitoring and facilitating the student-led discussions (IES, 2010).

Peer Tutoring. Hott and Walker (2012) stated that peer tutoring is a highly flexible instructional strategy that could be used in any content area. This strategy primarily involves two or more students who take turns serving in the tutor and tutee roles, to provide or receive feedback on an assignment or project (Hott &Walker, 2012). Nguyen (2013) stated that peer tutoring had been found to be successful in improving academic achievement for a diverse number of learners in any content field. In mathematics, Nguyen stated that positive gains were noted in computation and calculation when the peer-tutoring method was used and that the strategy most significantly affected learning disabled and elementary-aged students. Positive outcomes were exhibited in all key areas for reading achievement for both learning disabled students and their non-disabled peers (Nguyen, 2013). Wexler, Reed, Pyle, Mitchell, and Barton (2013) conducted a total of 13 quasi-experimental studies of the peer tutoring strategy's effect on the reading and mathematics skills of low-performing students in grades 6-12.

Wexler et al. synthesized a total of 13 studies in which teachers implemented a peer-tutoring strategy; they stated that ten studies used an experimental or quasi-experimental design and three additional studies followed a single-case design. All thirteen studies yielded positive correlations for increased academic outcomes in reading and mathematics, and when coupled with teacher feedback in addition to peer mediation, yielded significant gains in students' social and emotional skills as well (Wexler et al., 2013). Hott and Walker (2012) reiterated that this strategy works best when a lower-performing student is paired with a higher-performing student, but they point out that this can be a drawback as well. In high-low student pairing, Hott and Walker cautioned that the low-performing student was much more likely to benefit from this activity, as the low-performing student may lack the skills to provide relevant or accurate feedback for his or her higher-performing partner. Peer tutoring strategies were primarily successful because they allowed students to feel an increased sense of control, so they assumed a greater sense of responsibility for their learning (Scruggs, Mastropieri, & Marshak, 2012). Part of the success of the peer tutoring's strategy, they believed, could also be attributed to the feedback students received from a peer tutor and their teachers Scruggs et al. (2012) and Nguyen (2013) similarly stated that peer tutoring was more likely to be highly successful if the teacher and the students were well-trained in the use of the strategy. Nguyen (2013) observed that the most beneficial aspect of the peer tutoring strategy was that, when done right, it helped students to take personal responsibility for academic successes and failures. It also helped students to recognize ways to modify their learning behaviors, leading to increased success (Scruggs et al., 2012).

Connecting New Information to Previously Learned Information.

Rosenshine (2012) stated that highly successful teachers are able to effectively connect new learning to knowledge that was previously learned, and further investigated the effectiveness of an experimental mathematics teaching program. In a study of 40 Missouri fourth-grade math teachers, students were presented with a pretest-posttest design for standardized testing, to test the cognitive effects of relating the daily lesson to those previously taught (Rosenshine, 2012). He analyzed the data and determined that teachers who made clear and consistent efforts to relate new learning experiences to that which students had previously learned, had students who scored statistically higher in mathematics than their peers in classes where this teaching method was not applied. He clarified that the most successful teachers made sure that students had learned the material well, were given ample time to practice the skills, and connected the skills to prior learning experiences before moving on to a hands-on or project-based activity.

Teachers who utilized this strategy in reading, and presented information in smaller, manageable chunks helped students to summarize information and answer text-based questions more thoroughly and with greater depth (Rosenshine, 2012).

Cooperative Learning. Baines, Blatchford, and Kutnick (2003) stated that cooperative learning is a teaching technique that places students in small, mixed-ability groups to increase the learning of students in the group. Cooperative learning can be used in any subject and works best after students have been taught the skills they are to utilize individually before they begin to work in groups (Bishop &Verleger, 2013). The premise behind cooperative learning is for the teacher to provide students with a problem to discuss and solve in small groups, and then help them move towards abstract thinking capabilities. Its primary purpose is to help students gain greater depths of knowledge (Bishop & Verleger, 2013).

Gillies and Boyle (2010) interviewed ten junior high teachers with six to eight years of experience, from five separate schools in Brisbane, Australia, on their attitudes and perceptions about cooperative learning. All of the teachers taught students ranging from 10 to 14 years old and were highly regarded by their peers and were thought to be competent professionals who managed their classes well; furthermore, these teachers were open to the implementation of new research-based strategies designed to enhance or improve students' performance. Data were collected from the teachers' use of the cooperative learning strategy while reinforcing key skills taught in a science-based lesson (Gillies & Boyle, 2010). When the teachers were well-trained in the use of cooperative learning strategies, the students performed significantly better than in schools where teachers lacked training and practice. Trained and experienced teachers were able to embed cooperative learning strategies into their classroom curricula, which helped to foster increased student engagement and better communication between the students and teachers. Moreover, Gillies and Boyle’s (2010) study outcomes showed that cooperative learning promoted increased student cooperation and problem-solving skills, improved reasoning skills, and helped students present better arguments to support their positions. Finally, to be truly effective, these researchers believed students needed to feel supported by their teachers and that their classrooms were an emotionally safe place to openly engage in critical conversations.

Baines, Blatchford, and Kutnick (2003) found that despite being seated in small groups, elementary children were seldom presented with an opportunity to work together, even though their research found that cooperative learning was shown to improve academic performance and increase students’ development of social skills. The increased time spent on discussing key points of a lesson helped even young students feel more motivated to complete a task, and over time, led to increased self-esteem through their cooperative problem-solving successes. However, they noted that a cooperative learning strategy is not appropriate for all classrooms; for example, groups of 11 or more students were shown to not be effective. In oversized groups, or when the teacher did not make the objective clear, students did not interact well, lacked focus, and were often able to complete their tasks.

An Introduction to Learning Targets

There are five essential components of the learning targets instructional strategy (LTIS) crucial to students’ success: 1) being very clear about the learning intentions, 2) drawing students’ attention to a set of clearly defined, challenging learning goals, 3) presenting them with opportunity for accretive practice, 4) following up activities with adequate time for reflection, and 5) providing prompt feedback (Hattie, 2009). Marzano (2007) perceived that school districts had become increasingly aware of the need to develop and implement learning goals. Learning goals that highlight specific, targeted skills as a part of regular classroom instructional pedagogy are commonly referred to as learning goals, lesson objectives, or learning targets (Cheung, 2004). However, the terms are not mutually interchangeable. Hattie (2009) stated that to set learning goals teachers should purposefully and clearly state what the student will learn and know by the end of the lesson. DuFour and Marzano (2011) added that the learning target should clarify the skills and vocabulary students must master, and the specific way in which the skill level will be assessed. Moore, Garst, and Marzano (2015) clarified that "Learning targets [are created] at the same level of cognitive complexity as the academic standard that identifies the skills required to demonstrate mastery of the content" (p.8).

Moore, Garst, and Marzano (2015) interpreted a learning target to mean a specific tool intended to help teachers develop, plan, present, and assess lessons more effectively and efficiently. Chappuis (2015) asserted that while goal-setting and developing objectives are part of every teacher's lesson planning progress, implementing the use of a specific, posted, integrated, and articulated learning target is not. Stiggins, Chappuis, and Chappuis' (2009) showed that learning targets were most effectively implemented when four elemental stages were used with fidelity throughout the instructional process, including lesson presentation, student self-assessment, formative assessment and feedback, and using assessment data to drive instruction. Each of these stages must be implemented with consistency, which requires all teachers to use a common language and specific teacher actions to produce improved student achievement (Hattie, 2009; Marzano, 2013; Moore, Garst, and Marzano, 2015).

Tyack and Cuban (1995), Wagner, (2008), Marzano (2007), and Moore, Garst, and Marzano (2015) all examined multiple teaching strategies and methodologies and similarly concluded that little had changed in America's teaching practices over the past century. Schmoker (2011) believed that while schools were often quick to adopt a new or improved teaching methodology or strategy, they were equally as likely to discontinue it and swiftly move the focus to the next best thing. He maintained that in many cases neither the teacher nor student could adequately articulate what pupils were supposed to be learning or how they would know when the goal was achieved. Oftentimes, pupils could only describe the activity or assignment in which they were to participate, and then, only to a moderate degree of accuracy. He concluded that in many classrooms, there was an absence of clearly-defined and well-planned learning targets, which he believed to be the most basic element of an effectively presented lesson. Unlike instructional objectives, or student learning objectives (SLOs), which center on the instructional process, learning targets should be developed from content standards. They are written in student-friendly language, incorporated into the academic terminology with which students must become intimately familiar, and framed into the lesson from the students' point of view (Chappuis, Chappuis, & Stiggins, 2009; Moss & Brookhart, 2012). Learning targets should be employed to guide the teaching process during each lesson, and to connect key concepts together across a series of cohesive and continuous content standard (Moss & Brookhart, 2012).

The learning target is the main point or essential idea a teacher wants students to focus on learning for each day's lesson; it is not an explicit assignment, activity, or curricular standard (Chappuis, Chappuis, & Stiggins, 2009; Marzano, 2007; Moss & Brookhart, 2012; Schmoker, 2011). It is a goal based upon a comprehensive learning standard, such as those determined by the CCSS, which is then deconstructed into shared daily learning targets, and posted in "I can" statements (Stiggins, Arter, Chappuis, & Chappuis, 2009, p. 58). Explaining the daily learning target in well-defined terms at the beginning of the lesson is a critical first step in helping students identify the content that is expected to be mastered. Students cannot adequately assess their progress towards individual learning targets without a clear vision of what is to be learned in the day's lesson (Stiggins et al., 2009). Additionally, when used effectively and efficiently, the use of learning targets helped students connect the day's lesson with the larger learning goal or CCSS (Chappuis, Chappuis, & Stiggins, 2009; Marzano, 2007; Moss & Brookhart, 2012; Schmoker, 1996, 2011; Stiggins et al., 2009). Moreover, using purposeful, guided "I can" statements further aided students in taking ownership of their own learning, and in measuring their own progress (Chappuis, Chappuis, & Stiggins, 2009). Making a more permanent and systemic shift of this magnitude requires time and training for teachers and administrators to become adept at identifying those curricular resources that truly support this type of modification to the educational platform (Fisher & Frey, 2011; Marzano & Toth, 2013). Hattie, (2009, 2013), Moss, Brookhart, and Long, (2011), Moss and Brookhart, (2012), and Moore, Garst, and Marzano, (2015) all asserted that some of the more traditional instructional approaches to learning are no longer considered to be highly effective methods in equipping students with the skills necessary to be college and career ready.

Kena, et al. (2015) found that many teachers did not refer to or articulate the daily objectives or learning targets crucial to the subject matter they teach. Fisher and Frey (2014) iterated that focused instruction, typically presented to an entire class in fifteen minute periods of times or less, was one of the most important parts of the lesson. When teachers simply read text materials aloud and assigned worksheets based on that type of instruction, knowledge is not always adequately conveyed to students (Fisher & Frey, 2014). While teachers implement a variety of instructional strategies to help students gain content knowledge, Moore, Garst, and Marzano (2015) state that they often move too quickly from one independent strategy to another, resulting in a lack of educational direction and student disconnect. Moore et al. asserted that students would learn best when the lesson contains clear and focused learning goals or learning targets, and when they are presented with performance scales that clearly outline evaluated standards.

Three Types of Learning Targets. Three types of learning targets, interconnected and designed to work in conjunction with each other are: 1) learning goal targets; 2) foundational targets, and 3) cognitively complex targets (Moss & Brookhart, 2012). Learning goal targets are comprised of statements knowledge or skills the student is expected to learn (Moore, Garst, & Marzano, 2015). To increase continuity daily learning targets should be derived from state and local learning standards. Moore, Garst, and Marzano (2015) explained that foundational targets are comprised of the basic procedures and processes necessary to build upon skills and abilities gained from previous learning experiences; they are requisite to the current learning targets as they provide the baseline for the acquisition of new declarative and procedural knowledge. The third type of learning target is the cognitively complex target, which focuses on extending students' awareness of cognitive or psychomotor skills, to increase students' depth of knowledge (Moore, Garst, & Marzano, 2015).

Kozol (1992) believed that building a firm foundation in reading and mathematics would enhance students' early academic achievement, leading to collegiate and lifetime success. Marzano (2007) and Hattie (2009) both held that teachers must be intentional about sharing the learning target and assessment results with students regularly so that students are better equipped to utilize errors to modify their individual learning strategies. Marzano and Simms (2014) and Moore et al. (2015) held that the purpose of these targets is to connect students to a deeper level of understanding and comprehension and are inherently tied to the other two types of learning targets. Moore et al. (2015) reiterated that activities and lesson plans must not be mistaken for learning goals. To propel sagging nationwide educational outcomes and reduce the gaps between subgroups of students, Danielson (1996); McEwan (1998); Marzano and Simms (2014); and Stronge (2007) believe that presenting students with clearly defined goals, providing tasks which are centered on expected student outcomes, and providing meaningful feedbacks are critical elements in helping students to become autonomous learners. To improve academic outcomes, Hattie (2013) thought that the teacher and pupil must both be able to see the degree to which their efforts are successful. Moss and Brookhart (2012) concurred that feedback had a powerful effect on students and teachers, and helped them see areas that had been mastered and areas that needed improvement.

Seidle, Rimmele, and Prenzel (2005) found statistical significance at the .05 level in achievement in classes where teachers set clear, challenging and coherent goals or learning targets. Table 1 illustrates the findings from Hattie's (2009, 2011, 2015) comparative studies, and exhibits them in effect sizes. Hattie (2009) noted that in research studies, an effect size is a calculable measure of the difference between two or more groups, which provided a shared "expression of the magnitude of study outcomes for many types of outcome variables, such as school achievement… [where an] effect size of d = 1.0 indicates an increase of one standard deviation" (p.7). In Hattie's (2009) *Visible Learning* he suggests that an effect size of 0.40 could be considered the hinge-point or the gains teachers could expect from an average year of schooling. An effect size of one standard deviation for school achievement would then show a statistically significant improvement in student skills by two to three years (Hattie, 2009).

Using a goal-oriented approach to problem-solving has long been utilized in the business world to increase both motivation and productivity. The development of goals which are specific, measurable, attainable, results-oriented, and time-bound (SMART) has been found to improve employees' job performance rates significantly (O'Neill & Conzemius, 2006). Setting SMART goals has had a profound effect in the classroom as well (Ohio Department of Education [ODE], 2012). Additional study results (ODE, 2012) also indicated that teachers who based their lessons on a centralized learning target believed that the goal-oriented method of instruction helped to foster better teaching practices, emphasized further reflection upon what was taught, and helped students to see how the information was interconnected. Compared to other classroom strategies, Hattie (2015) found that the teacher's clarity of instruction yielded positive, significant effect sizes ranging from +4 to +8. Gollwitzer and Sheeran (2006) examined the correlations between setting academic goals and past learning behaviors. They analyzed 94 meta-analyses studies, and results indicated that setting goals significantly impacted future behavior. They believed that this classroom behavior could help close the gap between setting a goal and achieving it, at *d* = .61 (Gollwitzer & Sheeran, 2006). Table 1 shows other significant components supporting the use of learning targets included relevant, timely feedback, formative assessments, and mastery learning strategies all yielded higher effect sizes.

Table 1

Meta-Analysis Effect Sizes for Variables Significantly Affecting Student Outcomes

Year Study Participants	2009 (n= 138)	2011 (n=150)	2015 (n=195)
Teacher Clarity	+.8	+.8	+.8
Feedback	+.7	+.8	+.7
Formative Evaluation	+.9	+.9	+.7
Cognitive Task Analysis	*	*	+.9
Goal Setting [learning targets]	+.6	+.5	+.4
Self-Reported Grades	+1.44	+1.44	+1.33
Mastery Learning	+.6	+.6	+.6

Note: This table was adapted from Hattie's (2015) comparative ranking of variable influences and effect sizes related to student achievement available on the Visible Learning website. Hattie (2009, 2011, 2015) uses Cohen's *d* to represent the effect size and defines it as the difference between two means, divided by a standard deviation of the pooled groups or of the control group alone, with values ranging from 0 and 1.0 percent.

In his systematic review of variables that affected student performance and academic outcomes, Hattie (2013, 2015) ranked the variables by their effect sizes or the significance they had upon student achievement. He reported the effect sizes gained from the major components related to the LTIS, which included the elements of goal setting, timely feedback, providing formative evaluation, self-reporting or assessment, mastery learning, and teacher clarity, all had statistically significant effect sizes of +.5 or higher. His comparative illustration showed that the variable of providing formative assessments, an integral component of the LTIS, had the greatest effect size and helped students gain nearly three years of academic improvement in one year's time. Seidle, Rimmele, and Prenzel (2005) compared groups of students from a large suburban school, where one group of students was presented with clear learning goals and the other was not, and reported that students who were not presented with clear learning goals were unsuccessful in mastering key concepts, passing state examinations, and performed statistically more poorly than those in the goal-oriented group.

Setting learning [goals] targets also enabled students to reflect on their learning styles, facilitated them in peer and self-reflection activities, and allowed them to use critical feedback more effectively in revising their own work (Marzano, 2007). Students who are deeply engaged in the learning process develop the critical skills necessary for later workforce success, as many of those tasks are largely dependent upon those skills (Beebe, Beebe, & Ivy, 2016). Those students who lack critical skills in reading, writing, and mathematics skills will be crippled by this deficiency, which may further widen the already existing achievement gap between students of low socioeconomic statuses and their more affluent peers (Danielson, 1996; DeJarnette, 2012; & Zimmerman, 2012). Gorski (2013) stated that students should be taught these initial skills in a manner that helps them successfully engage in the learning process. Lloyd (2016) observed that American teachers should approach teaching mathematics from a different angle than simply the drill and practice format to preserve students' interest and increase their mathematics ability inside and outside the classroom environment. He concluded that while students in kindergarten through high school received a sufficient amount of mathematics instructional time, the problem was in the way the instruction itself was delivered.

Implementing Learning Targets. Teachers who added the use of shared learning targets, timely and relevant teacher feedback, performance scales and rubrics, and multiple types of assessments to gauge student learning were significantly more likely to create assessment-capable learners (Hattie, 2009). Hattie (2013) supported the idea that all lessons must focus on critical aspects of the learning target and provide specific, timely, and relevant feedback to both the student and teacher for both to refine their teaching and learning techniques. The successful implementation of the LTIS lists detailed steps shown to directly and significantly increase instructional quality when teachers and students aim for a visible, specific, and challenging learning target (Moss & Brookhart, 2012). The purpose of effective instruction centers on promoting active learning to directly increase student achievement (The Regents of the University of Michigan, 2016). Moss and Brookhart (2012) stated that the first principle in meaningful and effective teaching for both teachers and students is the presentation of clear daily learning targets. Researchers agreed that when the teacher and student efforts were codirected towards a shared target, both teachers and students were better able to track their progress towards the goal and adjust their efforts accordingly (Moss & Brookhart, 2012; Moore, Garst, & Marzano, 2015). Ensuring that efforts are focused on the right learning target is the driving force in the successful delivery of the lesson, as well as the key to defining the relationship between the participants and the educational outcome (Moss & Brookhart, 2012). They expressed that visible learning and the use of learning targets had a positive effect on instruction and ultimately increased student achievement and that a learning target should guide everything the teacher does to set students up for success. Successful teachers were those who selected essential content, identified skills and reasoning processes to be learned, and planned and delivered effective lessons.

Moss and Brookhart (2012) describe the repeated relationship between the use of learning targets to guide effective instruction, which causes an increase in meaningful learning and leads to increased student achievement. In their model, they explain that as students' academic achievement increases, the teacher modifies the learning targets to ensure students are making progress towards state and district curriculum goals. Using the LTIS caused the student and teacher to be specific and intentional about what content is to be gained from the lesson, and provided a focus for a particular day's lesson, but also ensures that all the activities surrounding the lesson contribute to a longer trajectory on the path to the larger academic standard or goal. Moore, Garst, and Marzano (2015) clarified that the learning target itself may be broad in nature, but to be effective, it must state what students will know and be able to do at the end of the lesson. Learning targets should also contribute to a broader scope and sequence of weekly or unit objectives

(Moss & Brookhart, 2012; Moore, Garst, & Marzano, 2015). Senn and Marzano (2015) explained that ultimately, the content material presented in the continuum of lessons should be developed from the district's core curriculum, thereby helping students to master district and state standards. Learning targets are can be adjusted for needs of the teacher and students in forming a logical and achievable plan for reaching the goal on the standard's trajectory.

Moss and Brookhart (2012) asserted that teachers should take into consideration these five questions when developing a sequential plan for student growth: 1) What have students already learned through the previous day's learning target? 2) How well was the concept or skill mastered? 3) Are there any points which need clarification or additional instruction? 4) Can students apply the knowledge or skill gained from the learning target? 5) What is the relationship of this lesson's learning target in connection with the scope and sequence of the next lessons, and to the chapter or unit goals? They clarified that it is only a learning target if both the student and the teacher are working towards the same objective for the day's lesson. Establishing a shared purpose for the lesson helps students develop a metacognitive awareness which is a key element in creative, critical thinking (Fisher & Frey, 2011, 2014).

Performance Scales. The most effective way teachers may share learning targets is to create strong performance scales outlining what students should understand at the culmination of the lesson, and construct the learning targets to coincide with the larger framework of what is to be learned by the end of the learning standard (Moss, Brookhart, & Long, 2011). At the culmination of the actions outlined on the teacher-developed performance scales or rubrics, researchers agreed that students and teachers should have a clear understanding as to the student's progress towards the learning target, and teachers should be able to modify their instructional practices accordingly (Moss, Brookhart, & Long, 2011; Seidle, Rimmele, & Prenzel, 2005; Zimmerman, 2001). Moore, Garst, and Marzano (2015) stated that performance scales aided in organizing the various types of learning targets on a continuum that spans from simple to abstract or complex thinking skills. The performance scales serve to establish a direct line of communication between the student and the teacher to outline the expected progression in the acquisition of the skills necessary to master the learning target. When introducing the lesson, the teacher should explicitly share the learning target for the day and explain how each of the tasks that are part of the lesson will lead students toward that target. Moreover, the learning goal or target for each lesson should be clearly written, in student-friendly language so students know and can articulate what they are expected to know and will be able to do.

Using Feedback to Modify Instruction. When educators partnered with students throughout the formative teaching-learning cycle, it helped to make teaching and learning visible, thereby increasing the opportunities to drive student learning forward (Moss & Brookhart, 2012). Using the data from formative assessments can help to bridge the gap between what students have already learned, and what they still need to master (Tomlinson, 2014). This process begins when the teacher models and explains the learning target and provides the students with guided practice activities to solidify the concept. In this part of the process, the teacher must design a strong performance scale to ensure a high level of student engagement and provide honest, formative feedback regarding progress towards the learning target (Moss, Brookhart, & Long, 2011). An active and intentional learning process can only occur when students and teachers partner in the systematic and continuous process of gathering formative data for the express purpose of improving student outcomes (Moss & Brookhart, 2012). Hattie (2013) iterated that this cycle of using formative assessment to collect data, provide student feedback, and allowing both the teacher and student to modify their educational behavior creates a visible teaching and learning process which has been statistically proven to raise student achievement. Researchers maintained that since the greatest change agent in the classroom was the teacher, improved academic outcomes would naturally occur when teachers partnered with students to develop their learning goals (Moss & Brookhart, 2012; Tomlinson, 2014; Whitaker, 2004). By narrowing the focus of the lesson to only those specific items which were crucial, teachers and students made informed decisions on the best ways in which to improve academic performance (Tomlinson, 2014).

Achieving the Standards. To ensure that students and teachers were held to rigorous standards, Moss and Brookhart (2012) encouraged teachers to set specific, appropriate, and challenging goals which they believed will lead to increased student motivation and outcomes. Teachers and students should set long and short-term goals to help cover a unit of study and were directly tied to the district's learning standards. Moore, Garst, and Marzano (2015) iterated that these goals serve different purposes on the educational continuum because learning targets served to subdivide the long-term goals into smaller, more manageable goals, and that the short-term goals then become the gauge toward obtaining and mastering the long-term goals set forth by state standards. Moss and Brookhart (2012) believed that following a continuum of short term goals allowed students and teachers to be better able to constantly monitor the concept attainment of each benchmark skill, while resolving temporary setbacks as they occur, resulting in increasing the probability of long-term academic success.

Developing Assessment-capable Learners. The most effective way to work towards closing the achievement gap using the visible learning process was to make each student an assessment-capable learner, meaning that educators teach students how to self-assess their progress towards the learning targets and goals, and provide them with continuous, timely, and relevant feedback to create assessment-capable learners (Hattie, 2012). Clearly, being assessment-capable does not guarantee that all students will perform well on high stakes testing; however, it does mean that students can gauge their progress toward their own learning. Therefore, with guidance and feedback from teachers, pupils can adjust their strategies and increase their success in mastering the learning target; additionally, they can adequately determine the need for teacher support, as opposed to simply needing more information from a text resource (Hattie, 2009, 2012; Moore, Garst, & Marzano, 2015; Moss & Brookhart, 2012). To become assessment-capable, learners must have a clear vision and description of where they are going, what resources and activities will be involved in getting there, and how they will know when they have accomplished the target (Hattie, 2012). Hattie (2012) reiterated that students need clear learning targets and success criteria or performance scales, such as exemplars and rubrics. A key ingredient in the assessment-capable process is teacher feedback. For factual, data-driven success in the learning process, students must be provided with specific activities and strategies designed to address weaknesses or insufficiencies for the feedback to truly be effective and contribute to the visible learning cycle (Hattie, 2009, 2012, 2013).

Using Learning Targets to Differentiate Instruction. Moss and Brookhart (2012) asserted that teachers should center on making certain that the activities and resources utilized by the teacher support academic growth and overall school improvement efforts. Differentiation demands that teachers create strong learning targets deeply rooted in content standards, but constructed to ensure increased student engagement and optimal understanding (Tomlinson, 2008). In Missouri, district leaders have a responsibility to ensure that teachers are teaching to the Missouri Learning Standards (Stader, 2013). These standards are based on the Common Core State Standards (Common Core State Standards Initiative, 2015). Students come from all walks of life and each has different needs to be successful in today's multicultural and technologically diverse learning environments, especially those who are disadvantaged or from lower socioeconomic statuses (Gorski, 2013). When used to their fullest potential, formative and summative assessments can yield valuable information to help teachers and students understand areas of strength and needs (Moss & Brookhart, 2012). Clearly, all students will not exhibit the same strengths and weaknesses, as some may be stronger in a particular academic discipline than others; understanding how to use this information accurately and consistently will help both partners to pinpoint individual needs so that the lesson may be differentiated to meet those deficits in understanding or conceptualization (Anderson, et al., 2001; Hattie, 2013; Moore, Garst, & Marzano, 2015; Moss & Brookhart, 2009, 2012).

The Assessment Process. Moss and Brookhart (2012) explained that creating significant, long-term instructional improvement requires that all staff and stakeholders, including teachers, students, and administrators, create and use specific and measurable learning targets. Determining what constitutes best practices differs among individual teachers and school districts, and the implementation of learning targets should not be viewed as simply another best-practice strategy (Hattie, 2009; Moss, 2011; Moss & Brookhart, 2012). Moss and Brookhart (2012) reinforced that, “If we want to finally close the achievement gap, we should concentrate on advancing practices that make a *significant* difference in student learning and achievement” (p.26). Using learning targets in a way that supports the visible learning cycle ensures that students are equally engaged in the learning process; they know where they are headed, how they are going to get there, and how they will know when they have achieved the standard (Hattie, 2012). Moreover, Hattie (2013) maintains that the positive impact of feedback is the crucial element needed to drive learning forward, and is the key missing element in many classrooms. Locke and Latham (2009) iterated that learners must be presented with tasks that are initially outside of their current level of performance but within the range of that which can be mastered by the end of a class period. Hattie (2013) noted that using learning targets, performance scales, and reciprocal feedback were all significant means of increasing the psychomotor or cognitive skills identified by the learning target, fed by instructional activities, and driven by objective assessments.

Summary

As instructors work to drive students towards ever-increasing expectations, students are also being asked to take personal responsibility for their academic acquisition and grapple to raise levels of metacognition and meet the challenges set forth by the more difficult and rigorous standards (Moore, Garst, & Marzano, 2015). Using learning targets as a research-based instructional strategy could improve student achievement in all academic areas, by incorporating student goal setting, teacher, and self-monitoring, the provision of feedback, and-and using assessment components to modify the learning targets (Moss & Brookhart, 2012). They asserted that students' assessment data should be used to develop the next learning target, which should be connected to the state and district curricular guidelines. Learning targets aid the teacher and student in knowing when the learning target has been achieved, raise students' academic acquisition, and helped teachers present information in a manner that is interesting, informative and sustainable (Vos & De Graaff, 2004). DuFour & Marzano (2011) concluded that students who can identify what they are learning and can articulate it in academic terminology will significantly outscore those who cannot. Students must be vested partners in identifying, establishing and articulating their learning goals and individual learning targets and assessing their progress (Marzano, 2007), to increase their performance and make sound academic progress in mathematics and CA and make adequate yearly progress (AYP) towards state and district curricular goals. Chapter three presents the current study's research design, population sample, and sampling procedure. Also, the instrumentation, data collection procedures, data analysis, hypothesis testing and study limitations will be discussed.

Chapter Three

Methods

The primary purpose of this study was to determine if the learning targets instructional strategy (LTIS) made a difference in students Missouri Assessment Program test scores after two years of implementation. This chapter presents the methodology employed to conduct a quantitative research study. This chapter first outlines the research design, identifies the sample population, and describes the sampling procedure. These sections are followed by the identification of data collection procedures, and the instrumentation utilized. Finally, data analysis and hypothesis testing methods, including the study's research questions, are identified and a review of study limitations are presented.

Research Design

A quasi-experimental, quantitative research design was used to determine the effect that the implementation of the LTIS had on the CA and math skills of 4^{th} through 8^{th}-grade students at the District X, as measured by the Missouri Assessment Program (MAP) tests. The independent variables included were student progress over time and curriculum type (CA and math) for 4^{th} through 8^{th}-grade students. The independent variable, instructional methodology, was the LTIS. This strategy was incorporated into District X. Archival MAP data was collected over three years and analyzed to determine the effect the LTIS had upon 4^{th} through 8^{th}- grade students' achievement in CA and math (see Table 2).

Table 2

Description of Cohorts' Composition and School Years Evaluated

Grade Level	2011-2012	2012-2013	2013-2014	N
Cohort 1	4th Grade	5th Grade	6th Grade	7
Cohort 2	5th Grade	6th Grade	7th Grade	8
Cohort 3	6th Grade	7th Grade	8th Grade	10

Note. MAP data from 2011-2012 provided baseline scores before implementation of the LTIS.

Selection of Participants

The sample for the current study included a total of 25 students in grades four through eight from one rural, K-8, Missouri school district. Table 2 (above) shows the population which included all students who participated in the Missouri Assessment Program (MAP) for all three years of the current study. The study followed students' MAP progress beginning in 4^{th}, 5^{th}, and 6^{th} grades through the 6^{th}, 7^{th}, and 8^{th} grades respectively, in the 2012-2013 and 2013-2014 school years.

Measurement

The Missouri Assessment Program is a yearly standards-based test that measures specific skills defined for each grade by the state of Missouri (Missouri Department of Elementary and Secondary Education [MDESE], 2015a). The Missouri Assessment Program (MAP) evaluates students' progress toward mastery of the Missouri Learning Standards, formerly known as the Show-Me Standards, which outline the specific academic skills Missouri students must master for each grade level (MDSE, 2016c). District X participates in yearly MAP testing and students' mathematics and CA scores were collected from the 2011- 2012 school year, and compared to scores from the following two years, after the implementation of the LTIS. Data was analyzed to determine the effect this instructional methodology had upon students' CA and math achievement in this district, as measured by the MAP test.

Student performance on the MAP test in CA and math was reported in one of four levels, ranging from below basic to advanced. The number of correct responses given by a student on the MAP-CA test was used to develop the scale scores. Scale scores are derived from the statistical conversion of raw scores, which creates a standardized method of evaluation, allowing students' MAP scores to be consistently compared across multiple test categories (CTB/McGraw-Hill, 2015b). The scale scores for student achievement are converted into percentile ranks from the Terra Nova portion of the MAP test and reported on a norm-referenced continuum for fourth through eighth-grade participants (CTB/McGraw-Hill, 2015b). Students' mean scaled scores were then used to determine their overall level of achievement in CA and mathematics, as measured by the MAP test. These tests were appropriate measures of student achievement and are the primary method the state uses to determine students' yearly educational progress. The norm-referenced achievement scores reflected students' progress over one school year. The Terra Nova reports students' performance levels and individual mastery of the state standards in CA and math in percentile ranks that range from 1 to 99 (CTB McGraw-Hill, 2015b). Terra Nova results can be used to compare students' academic progress to prior years' performance, yielding a greater scope of students' growth over time.

The Missouri Assessment Program (MAP) is a standardized achievement test designed to evaluate students' mastery of the Missouri Learning Standards (MDESE, 2014) and was the primary source used to collect data for the current study. According to the CTB/McGraw-Hill website (2015), the term “standardized" means that the MAP test is always administered, recorded, and scored in the same way, for all subtests given in all content areas. The same test items were administered to each student, and the same written and oral directions were administered for each test or subtest. Specific time limitations were set for all tests. Students’ academic performances were then compared to all other students who took the test statewide. The current study examined archived CA and math MAP test data from the 2012-2013 school year and the 2013-2014 school year, for all 4th through 8th-grade students from District X.

The CA test is comprised of four subtests that include reading comprehension, written language, listening comprehension, and research. The MAP-CA test requires an estimated five to seven hours to complete, using the on-line testing platform, for the four subtest areas (CTB/McGraw-Hill, 2015). The tests were then scored by the Data Recognition Corporation (DRC), under the supervision of CTB/McGraw-Hill Education (CTB/McGraw-Hill, 2015b). The CA MAP test was comprised of multiple types of test items, which included constructed-response, multiple choice, and performance tasks. Multiple choice items were formatted to provide students with a question, followed by two to five response options. Constructed-response items on the CA subtest required students to read a selection and construct a written response based on the prompt. The performance task on the MAP-CA test was presented in an essay format. Furthermore, a research component was added to the performance task section of this test in 2014 (CTB/McGraw-Hill, 2015a). Students were required to script a final copy to submit online (CTB/McGraw-Hill, 2015a). The CA sections of the MAP for fourth through eighth grades encompassed five basic areas of the Dynamic Learning Maps Essential

Elements (DLMEE) which were: 1) Reading Literature; 2) Reading Informational Text; 3) Writing; 4) Speaking and Listening; and 5) Language (Dynamic Learning Maps Consortium, 2013a).

The mathematics MAP test was administered in an online format and was comprised of multiple types of test items, including constructed-response, multiple choice, and performance tasks (CTB/McGraw-Hill, 2015a). The multiple-choice items presented students with a question, and two to five answers from which to select. The constructed-response items required students to show their work and describe their thought processes on problem-solving items. The performance tasks further required students to utilize several tools which are available to them online, such as rulers, compasses, charts, and graphics. Mathematics MAP tests evaluate the following skills for grades three through six: 1) Operations and Algebraic Thinking, 2). Numbers and Operations in Base Ten, 3) Fractions, 4) Measurement and Data, and 5) Geometry (Dynamic Learning Maps Consortium, 2013b).

Data Collection Procedures

Data collection began with an informal discussion about the purpose of this investigation with the superintendent of District X. Upon verbal approval, a letter of request was sent to the superintendent and school board of District X, on Jan. 15, 2017, to request permission to collect and study archived MAP data from central office files. Permission was granted pending approval from Baker University's Internal Review Board (IRB) (see Appendix A). On January 25, 2017, an application was submitted to the Baker University Institutional Review Board (IRB) for permission to conduct the current study (see Appendix B). The IRB granted permission for the current study on

Feb. 2, 2017 (see Appendix C). The Board of Education granted permission for the current study and for the collection of MAP data on February 22, 2017. Data collection began upon school board approval, with the caveat that all personal student information be withheld (see Appendix D). The purpose was to determine if using the LTIS caused a change in students' CA and math MAP scores. MAP data were collected from the 2011-2012, 2012- 2013, and 2013-2014 school years in CA and math. MAP results from the sample data were downloaded from the CTB/McGraw-Hill (2015a) and from the Missouri Department of Elementary and Secondary Education (MDESE) website (2015a) for the 2011- 2012, 2012- 2013, and 2013-2014 school years. The data were downloaded from the MDESE (2015a) web site to school district computers by the test coordinators from District X. The downloaded data were entered in an Excel format by the researcher. Identifying student information was withheld from the Excel document to protect students' anonymity.

Students' raw scores were first converted into percentile ranks by the CTB/McGraw-Hill (2015a). A percentile rank is a converted raw or scale score that expresses a student's performance in relation to their peer group in percentile points (CTB/McGraw-Hill, 2015a). Percentile ranks range (1 to 99) and are used for reporting MAP test results. The national percentile averages both nationwide and for the state of Missouri is 50%. Students percentile scores were used to analyze the level of student progress because they yield equivalent measures for students in different grade levels, who took different forms of the MAP test. Students' MAP percentile scores in CA and math were entered for all student participants in fourth through eighth grades from District X and analyzed using JASP statistical software (The JASP Team, 2016).

The MAP test was administered to the third through eighth-grade students in District X, but scores were only collected from those in fourth through eighth grades because those students had an equal opportunity of exposure to the treatment. Baseline data were collected for the study in the area of CA and math after the 2011-2012 MAP results were made available.

D**ata Analysis and Hypothesis Testing.**

Post-intervention data were collected from the fourth through eighth-grade students to address each of the research questions addressed in the current study. The significance level was set at α = .05. The following research questions and hypotheses were addressed in this investigation of the effectiveness of the learning target instructional technique (Moore, Garst, & Marzano, 2015). Finally, the data were uploaded into the JASP 0.7.5 Statistics program (The JASP Team, 2016).

RQ1. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (4th, 5th, 6th) and curriculum type (CA and math) for Cohort One, during the implementation of the learning targets instructional strategy? (α = .05).

H1a. Significant mean differences were found in student MAP scores when broken down by progress over time across three grade levels, 4^{th}, 5^{th}, and 6^{th} (Cohort One). (α = .05).

H1b. Significant mean differences were found in student MAP scores when broken down by curriculum type (CA and math). (α = .05).

H1c. Significant mean differences were found in student MAP scores among the interaction between progress over time and curriculum type (α = .05).

RQ2. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (5^{th}, 6^{th}, 7^{th}) and curriculum type (CA and math) for Cohort Two, during the implementation of the learning targets instructional strategy? (α = .05).

H2a. Significant mean differences were found in student MAP scores when broken down by progress over time across three grade levels, 5^{th}, 6^{th}, 7^{th} (Cohort Two). (α = .05).

H2b. Significant mean differences were found in student MAP scores when broken down by curriculum type (CA and math). (α = .05).

H2c. Significant mean differences were found in student MAP scores among the interaction between progress over time and curriculum type. (α = .05).

RQ3. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (6^{th}, 7^{th}, 8^{th}) and curriculum type (CA and math) for Cohort Three, during the implementation of the learning targets instructional strategy? (α = .05).

H3a. **S**ignificant mean differences were found in student MAP scores when broken down by progress over time across three grade levels, 6^{th}, 7^{th}, 8^{th} (Cohort Three). (α = .05).

H3b. Significant mean differences were found in student MAP scores when broken down by curriculum type (CA and math). (α = .05).

H3c. Significant mean differences were found in student MAP scores among the interaction between progress over time and curriculum type. (α = .05).

Analysis Methods for H1a, H1b, and H1c. A two-way repeated measures ANOVA was conducted to test H1a, H1b, and H1c. Data from a cohort group of students (Cohort One) was collected over time, from fourth to sixth grades, to determine the main effect and interactions for dependent variables of student progress over time (H1a) and curriculum type (H1b). The two categorical factors used to group the dependent variable were progress over time and curriculum type (CA and math). The repeated measures ANOVA was used to test these hypotheses and determine the main effects (H1a and H1b) and interaction for progress over time and curriculum type (H1c) in CA and math. These tests evaluated the change in student progress over a three-year period, during their exposure to the learning targets instructional strategy (LTIS). MAP student data from 2011-2012, the year prior to the introduction of the new instructional approach, were collected as the baseline data. The data were then compared to the same students' MAP data in 2012-2013 and 2013-2014 school years after those students were exposed to the LTIS. The level of significance for all statistical tests was set at .05. The data were uploaded into the JASP 0.7.5 Statistics program (The JASP Team, 2016).

Analysis methods for H2a, H2b, and H2c. A two-way repeated measures ANOVA was conducted to test H2. MAP data were collected over three school years for a cohort group of students (Cohort Two) from fifth to seventh grades, to determine the main effect (H2a and H2b) and interactions between progress over time and curriculum (H2c) for the dependent variable of student achievement as measured by the MAP. The two categorical factors were used to group the dependent variables progress over time and curriculum type (CA and math). The repeated measures ANOVA was also used to test for the interaction between progress over time and curriculum type (H2c). This test evaluated the change in student progress over a three-year period of time, during exposure to the LTIS. Student MAP data from 2011-2012, the year prior to the introduction of the new instructional approach, were collected as the baseline data. The data were then compared to the same students' MAP data in the 2012-2013 and 2013-2014 school years after those students were exposed to the LTIS. The level of significance for all statistical tests was set at $\alpha = .05$. The data were uploaded into the JASP 0.7.5 Statistics program (The JASP Team, 2016).

Analysis methods for H3a, H3b, and H3c. A two-way repeated measures ANOVA was conducted to test H1a, H1b, and H1c. Data from a cohort group of students (Cohort One) was collected over time, from fourth to sixth grades, to determine the main effect and interactions for dependent variables of student progress over time (H3a) and curriculum type (H3b). The two categorical factors used to group the dependent variable were progress over time and curriculum type (CA and math). The repeated measures ANOVA was used to test these hypotheses and determine the main effects (H3a and H3b) and interaction for progress over time and curriculum type (H3c) in CA and math. These tests evaluated the change in student progress over a three-year period, during their exposure to the learning targets instructional strategy (LTIS). MAP student data from 2011-2012, the year prior to the introduction of the new instructional approach, were collected as the baseline data. The data were then compared to the same students' MAP data in 2012-2013 and 2013-2014 school years after those students were exposed to the LTIS. The level of significance for all statistical tests was set at .05. The data were uploaded into the JASP 0.7.5 Statistics program (The JASP Team, 2016).

The Tukey's Post Hoc analysis methods for Honestly Significant Difference (HSD) test was selected as the follow-up method to be conducted if statistically significant main effects or interactions were exhibited in the analyses. This procedure was also used to control for a Type I error and further evaluate any between-groups variances among the means of the independent variables of progress over time and curriculum type had upon the dependent variable of Missouri Assessment Program scores, during the implementation of the learning targets instructional strategy.

Limitations

Limitations of the current study are variables that may affect the outcome of the study and are factors which are beyond the researcher's control (Lunnenburg & Irby, 2008). Moreover, limiting factors might have an effect on the interpretation of the findings or on the researcher's ability to generalize the study results (Lunenburg & Irby, 2008). In the current study of the implementation of the learning targets instructional strategy (LTIS) and its effect on 4^{th} through 8^{th}-grade students' CA and math MAP scores, the following factors were perceived limitations.

1. The fidelity with which teachers implemented the new initiative may have varied due to their familiarization with the LTIS.
2. Teachers may have personalized this initiative due to varied teaching styles.
3. Teachers may have varied in the way they provided feedback, performance scales, and shared data with students to increase accountability.
4. Students participating in the MAP may not have put forth sufficient effort on the tests, therefore performing more poorly than otherwise capable.

5. The MAP testing format was changed to an entirely computer-based assessment in 2014, rather than a pencil and paper format, thus impacting student performance.

Summary

The current study evaluated the effect that the use of the learning targets instructional strategy (LTIS) had upon the mathematics and communication arts (CA) skills for three cohort student groups across a three-year time span in one small, rural school setting. Archival MAP data were evaluated to determine if any change occurred in CA or math achievement scores after the LTIS was implemented in the 2012-2013 and the 2013-2014 school years. Study instrumentation, including measurements for the evaluation of reliability and validity, were described in this chapter, as well as the procedures for data analysis and testing the hypotheses. The results of the current study will be presented in Chapter four.

Chapter Four

Results

The purpose of the current study was to investigate the extent of the differences in communication arts (CA) and mathematics (math) achievement for fourth through eighth-grade students as measured by the Missouri Assessment Program (MAP) test, after the implementation of the learning targets instructional strategy (LTIS). The current study collected data from three student cohort groups, across three school years, (2011-2012, 2012-2013, 2013-2014) to measure the effect that exposure to the LTIS had upon student performance in a small rural school district. Baseline data were collected for three cohort groups beginning in 2011-2012 before the LTIS was implemented. Archival MAP data were then collected and evaluated for the 2012-2013 and 2013-2014 school, using JASP statistical software, and compared to the baseline data collected (The JASP Team, 2016). The cohort groups consisted of the same students who were followed for three years, beginning in grades four, five, and six respectively, and ending in grades six, seven, and eight. Analyses results are presented in this chapter.

Descriptive Statistics

Descriptive statistics are “the mathematical procedures for organizing and summarizing numerical data” (Lunenburg and Irby, 2008, p. 63). In education, it is generally assumed that students will increase in their achievement scores as they progress through grade levels.

Descriptive repeated measures statistics show that for Cohort One (across 4th, 5th, and 6th grades) students performed better on their MAP tests from 2012 to 2014 (Mean Difference = -2.52). Results of a test of statistical significance showed that Cohort Two (across 5th, 6th, and 7th grades) showed a significant level of improvement in their MAP scores. As depicted in Table 3, Cohort 3 (across 6th, 7th, and 8th grades) MAP scores declined (Mean Difference = 14.7) after two years' exposure to the LTIS. The next section will also provide a detailed explanation of each research hypothesis, the method used to test the hypothesis, and a description of the results for each.

Table 3

Descriptive Statistics for Each Cohort Across 3 Academic Years

		2011-2012		2012-2013		2013-2014		2011-2012-2013-2014
Cohorts	*N*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*MD*
Cohort 1	7	53.75	27.82	60.64	25.96	56.27	25.09	-2.52
Cohort 2	8	38.75	14.61	52.6	12.44	65.06	26.41	-26.23
Cohort 3	10	76.14	13.66	79.55	12.69	61.44	20.01	14.7

Note: MD = Mean Difference. Mean difference values represent changes from one academic year to the next, beginning with the first year of exposure to the LTIS.

Hypothesis Testing

This section contains the results of the statistical tests that were conducted to test the hypotheses for each research question. Each question is separately addressed. This section is organized in the following manner: For RQ1, RQ2, and RQ3 the hypotheses findings are presented in three sections. First, the Results of Repeated Measures ANOVA will present the significance of findings. Next, the Significant Interaction Follow-Up Results will provide descriptive follow-up for the interaction. Finally, the Post hoc Analysis Results will present findings for the Significant Main Effects.

RQ1. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (4th, 5th, 6th) and curriculum type (CA and math) for Cohort One, during the implementation of the learning targets instructional strategy? (α = .05).

H1a. Significant mean differences were found in student MAP scores when broken down by progress over time across three grade levels, 4th, 5th, and 6th (Cohort One). (α = .05).

H1b. Significant mean differences were found in student MAP scores when broken down by curriculum type (CA and math). (α = .05).

H1c. Significant mean differences were found in student MAP scores among the interaction of progress over time and curriculum type. (α = .05).

A two-way repeated measures ANOVA statistical test of significance was conducted to test H1 using JASP statistical software (The JASP Team, 2016). The statistical analysis was conducted to determine the main effects of progress over time (H1a), curriculum type (H1b). The ANOVA was also used to determine the interaction between student progress over time through grades 4th, 5th, and 6th and the curriculum type (CA and math) achievement scores (H1c). The Missouri Assessment Program (MAP) test was used to measure student achievement in CA and Math. Data were collected over a three period. In Year 1 (4th grade) MAP data were collected for this student cohort group from the 2011-2012 academic year. Data were then compared to MAP scores collected from Year 2 in 2012-2013 (5th grade) and Year 3 in 2013-2014 MAP (6th grade), during the implementation of the LTIS. Main effects for progress over time and curriculum were evaluated, as well as the interaction between the two independent variables.

Summary Results for Repeated Measures ANOVA Tests of Significance. As shown in Table 4, no significant within subject main effect was found for student achievement for progress over time (F = 0.531, *df* = 2, 20, *p* = .595). Per Lunenburg and Irby (2008) a post hoc analysis was not warranted. H1a was not supported for the main effect of progress over time.

As shown in Table 4, significant interaction between student progress over time and curriculum (F = 8.190, df = 2, 20, p = .002) was found. Since JASP does not generate a post hoc interaction analysis, descriptive follow-up methods were used to interpret the interaction results (The JASP Team, 2016).

Table 4

Summary of ANOVA Main Effects and Interaction of Time and Curriculum for Cohort 1 (4th, 5th, 6th Grades) Over 2011-2012, 2012-2013, and 2013-2014

	SS	*df*	*MS*	*F*	*p*
Progress Over Time	100.4	2	50.21	0.531	.595
Progress Over Time ✻ curriculum	1625.6	2	853.36	8.598	.002
Residual	2268.7	24	94.53		

Note. The asterisk denotes an interaction between progress over time and curriculum.

Table 5 reports no significant main effect for curriculum type (F =0.387, *df* = 1, 20, *p* = .546). Per Lunenburg and Irby (2008) a post hoc analysis was not warranted. H1b main effect of curriculum type was not supported.

Table 5

ANOVA Results for Main Effect of Curriculum for Cohort One

	SS	*df*	*MS*	*F*	*p*
Curriculum	579	1	579.4	0.387	0.546
Residual	17978.2	12	1498.2		

Note. Type III Sum of Squares

Post Hoc Results for Main Effects. The Post Hoc tests of significance for the main effects were not conducted. As shown in Tables 4 and 5, the main effects progress over time (p = .595) and curriculum were not significant (p = .546). H1a and H1b were not supported for the main effect of progress over time.

Follow Up Interpretation of the Interaction Effect. A significant interaction was reported in Table 5, between progress over time and curriculum (F = 8.190, df = 2, 20, p = .002). Since JASP does not generate an interaction post hoc, descriptive analysis methods were used to identify performance gaps. Field (2013) stated that "graphs are very useful for interpreting interaction effects" (p.3). Following the advice of Field (2013), evidence for the location of the gaps between and among the interaction variables was reported in Figure 1 and Table 6.

Figure 1 shows that for Cohort One, a significant interaction between progress over time and curriculum was found between CA and Math in 2012-2013, after one year of exposure to LTIS. Figure 1 does not show parallelism in the 5th grade. The non-parallelism shown Figure 1 pointed to the fifth grade as the location of significant difference between student achievement scores in CA and math. Figure 1 shows that the mean differences between 6th grade CA and Math scores were statistically significant

(Standard Error = 6.937). The gap between CA and Math achievement as shown in Figure 1 identifies the greatest interaction effect for progress over time between CA and math curriculum after the implementation of the LTIS. Fifth-grade students were negatively impacted in the area of CA after Year 1 of LTIS implementation.

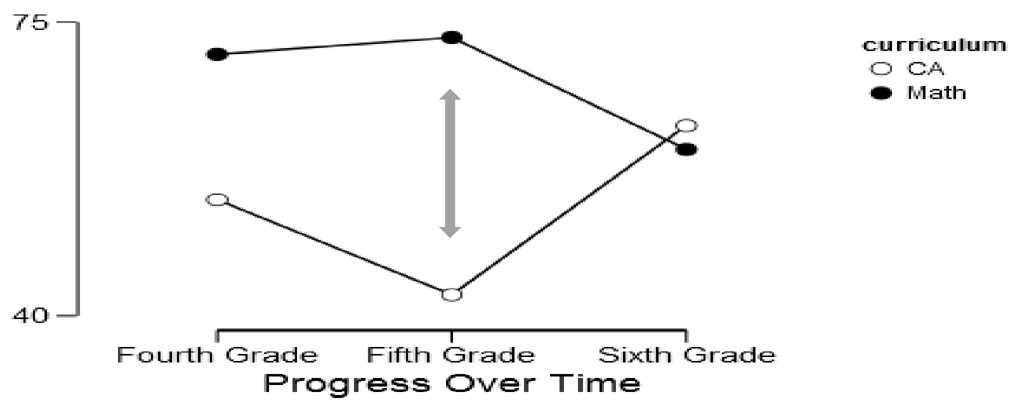

Figure 1. Comparison of Cohort One (4^{th}, 5^{th}, 6^{th} grade) students (n = 7).

The x-axis indicates student progress over three school years. The y-axis indicates students' mean percentile ranks. Table 6 verified the findings reported above. Table 6 reported descriptive statistics for Cohort One's significant interaction between progress over time and curriculum type. Progress over time significantly interacted with curriculum type between grades four and six (Mean difference = -19). After two years of exposure to the LTIS, students in the 6th grade exhibited a 21-point mean difference between CA and Math MAP scores. Results showed a decline in 6^{th}-grade students CA performance after one year of exposure to the LTIS. These results suggest an implementation dip occurred after the introduction of the new initiative. Student CA scores rebounded after the second year of exposure to the strategy in year three, surpassing their baseline scores from fourth grade.

Table 6

ANOVA Results for Interaction Between Progress Over Time and Curriculum Type for Cohort 1

Grade Level	Curriculum	*N*	*M*	*SD*	*MD*
Fourth Grade	CA	7	58.43	28.11	*
	Math	7	66.86	19.04	*
Fifth Grade	CA	7	49.57	29.49	8.86
	Math	7	66.86	17.44	1.6
Sixth Grade	CA	7	68.57	18.93	-19.00
	Math	7	60.29	26.26	6.57

Note: MD = mean difference. Sixth grade mean difference (MD) values indicate the difference between students' fourth and sixth grade MAP performance.

RQ2. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (5^{th}, 6^{th}, 7^{th}) and curriculum type (CA and math) for Cohort Two, during the implementation of the learning targets instructional strategy? ($\alpha = .05$).

H2a. Significant mean differences were found in student MAP scores when broken down by progress over time across three grade levels, 5^{th}, 6^{th}, 7^{th} (Cohort Two). ($\alpha = .05$).

H2b. Significant mean differences were found in student MAP scores when broken down by curriculum type (CA and math). ($\alpha = .05$).

H2c. Significant mean differences were found in student MAP scores among the interaction between progress over time and curriculum type. ($\alpha = .05$).

A two-way repeated measures ANOVA statistical test of significance was conducted to test H2 using JASP statistical software (The JASP Team, 2016). The statistical analysis was conducted to determine the main effects of progress over time (H2a), curriculum type (H2b) and the interaction between student progress over time (through grades 5th, 6th, and 7th) and the curriculum type (CA and math) achievement scores (H2c). The Missouri Assessment Program (MAP) test was used to measure student achievement in CA and MA. Data were collected over a three period. In Year 1, MAP data were collected for this student cohort group (5th grade) from the 2011-2012 academic year. Data were then compared to MAP scores collected from Year 2 in 2012-2013 (6th grade) and Year 3 in 2013-2014 MAP (7th grade), during the second year of the LTIS implementation. Main effects for progress over time and curriculum were evaluated, as well as the interaction between the two independent variables.

Summary Results for Repeated Measures ANOVA Tests of Significance. As shown in Table 7, a significant within subject main effect was found for progress over time *(*$F = 6.177$, $df = 2, 20$, $p = .006$). Per Lunenburg and Irby (2008) a Tukey's HSD post hoc analysis was conducted. The results of the post hoc are illustrated in Table 9. H2a was supported for the main effect of progress over time. No significant interaction between progress over time and curriculum (H2c) was found ($F = 1.396$, $df = 214.3$, $p = .264$). H2c was not supported.

Table 7

ANOVA Results for Main Effects and Interaction of Progress Over Time and Curriculum Type for Cohort 2 Across 5th, 6th, and 7th Grades

	SS	*MS*	*df*	*F*	*p*
Progress Over Time	1896.2	2	948.1	6.177	.006
Progress Over Time ✻ Curriculum	428.7	2	214.3	1.396	.264

Note. Type III Sum of Squares. The asterisk denotes the test for an interaction between progress over time and curriculum.

Table 8 reports no significant main effect for curriculum type (F = 4.517, *df* = 1, 14, *p* = .052). Per Lunenburg and Irby (2008) a post hoc analysis was not warranted. H2b was not supported for the main effect of curriculum type.

Table 8

Between-Subjects Effects for Main Effect of Curriculum for Cohort 2 (Across 5th, 6th, 7th Grades).

	SS	*df*	*MS*	*F*	*p*
Curriculum	1398	1	1397.5	4.517	.052
Residual	4332	14	309.4		

Note. Type III Sum of Squares

Post Hoc Results for Main Effects.

As shown in Table 9, post hoc analysis shows no significant achievement differences between grades five and six, or between grades six and seven. Results confirmed that a significant difference in student achievement occurred between fifth and seventh grades (Mean Difference = -15.375, t = -3.51, p-Tukey =.004). Results indicated that student progress over time, (from 5th to 7th grades) changed significantly after two years of exposure to the LTIS. The post hoc test confirmed the significant main effect of progress over time for Cohort Two, indicating that the LTIS made a significant change in student achievement over a two-year period, supporting H2a.

Table 9

Post Hoc Comparisons for Student Achievement and Progress Over Time for Cohort 2 (5th, 6th, 7th grades) from 2011-2012, 2012-2013, and 2013-2014 School Years.

Grade levels			*MD*	*SE*	*t*	*p*
Fifth Grade	to	Sixth Grade	-7.00	4.38	-1.598	.263
Sixth Grade	to	Seventh Grade	-8.071	4.38	-1.912	.154
Fifth Grade	to	Seventh Grade	-15.375	4.38	-3.51	.004

Note. MD = Mean difference in the post hoc test for progress over time.

Figure 2 illustrates significant student progress over time on MAP scores for Cohort Two.

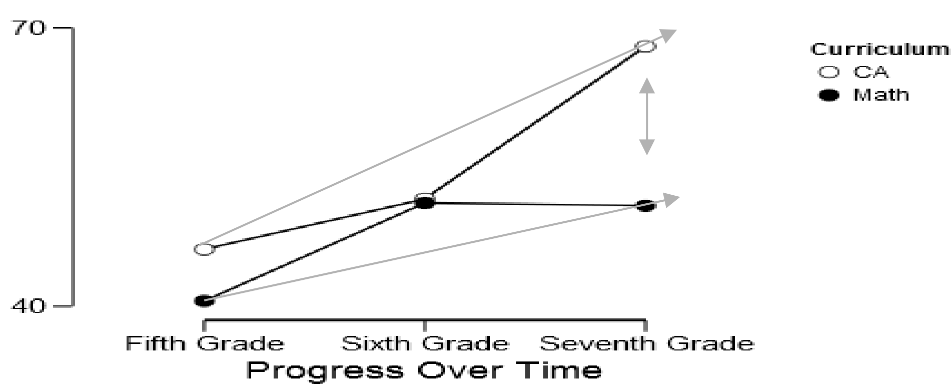

Figure 2. Comparison of Cohort Two (across 5th, 6th, 7th grades) students (n = 8) scores in CA and Math.

The x-axis indicates student progress over three school years. The y-axis indicates the range of MAP percentile scores reported across 2011-2012, 2012-2013, and 2013-2014 school years (progress over time). Values illustrate relative parallelism in student achievement in 2011-2012 and 2012-2013. Figure 2 shows the non-parallelism of student MAP scores in 2013-2014. Cohort Two student scores rose significantly from fifth grade to seventh grade in CA (p-Tukey = .004), supporting the main effect finding for progress over time.

Follow Up Interpretation of the Interaction Effect. Since no significant interaction was found between the independent variables of progress over time and curriculum type in CA and math (p = .264), no follow-up interpretation was warranted.

RQ3. To what extent was there a mean difference in student MAP scores when broken down by the independent variables of progress over time across three grade levels (6^{th}, 7^{th}, 8^{th}) and curriculum type (CA and math) for Cohort Three, during the implementation of the learning targets instructional strategy? (α = .05).

H3a. Significant mean differences were found in student MAP scores when broken down by progress over time across three grade levels, 6^{th}, 7^{th}, 8^{th} (Cohort Three). (α = .05).

H3b. Significant mean differences were found in student MAP scores when broken down by curriculum type (CA and math). (α = .05).

H3c. Significant mean differences were found in student MAP scores among the interaction between progress over time and curriculum type. (α = .05).

A two-way repeated measures ANOVA statistical test of significance was conducted to test H1 using JASP statistical software (The JASP Team, 2016). The statistical analysis was conducted to determine the main effects of progress over time (H2a), curriculum type (H3b) and the interaction between student progress over time (through grades 6^{th}, 7^{th}, and $8^{th)}$ and the curriculum type (CA and math) achievement scores (H3c). The Missouri Assessment Program (MAP) test was used to measure student achievement in CA and MA. Data were collected over a three period. In Year 1 (6th grade) MAP data were collected for this student cohort group from the 2011-2012 academic year. Data were then compared to MAP scores collected from Year 2 in 2012-2013 (7^{th} grade) and Year 3 in 2013-2014 MAP (8^{th} grade), during the implementation of the LTIS. Main effects for progress over time and curriculum were evaluated, as well as the interaction between the two independent variables.

Summary Results for Repeated Measures ANOVA Tests of Significance. As shown in Table 10, no significant within subject main effect was found for student achievement for progress over time (F = 1.878, *df* = 2, 36, *p* = .168). Per Lunenburg and Irby (2008) a post hoc analysis was not warranted. H1a was not supported for the main effect of progress over time.

As shown in Table 11, significant interaction between student progress over time and curriculum (F = 5.882, *df* = 2, 36, *p* = .006) was found. Since JASP does not generate a post hoc interaction analysis, descriptive follow-up methods were used to interpret the interaction results.

Table 10

Results for Main Effect and Interaction of Progress over Time and Curriculum Type for Cohort 3

	SS	*df*	*MS*	*F*	*p*
Progress Over Time	276	2	138.02	1.878	.168
Progress Over Time ✻ Curriculum	864.7	2	432.35	5.882	.006
Residual	2645.9	36	73.5		

Note. Type III Sum of Squares. The asterisk shows the interaction between progress over time and the curriculum type (CA and math).

Table 11 reports no significant main effect for curriculum type (F =4.389e -4, *df* = 1, 18, *p* = .984). Per Lunenburg and Irby (2008) a post hoc analysis was not warranted. H2b for the main effect of curriculum type was not supported.

Table 11

ANOVA Results for Main Effects of Curriculum for Cohort Three

	SS	*df*	*MS*	*F*	*p*
Curriculum	0.15	1	0.15	4.389e -4	.984
Residual	6151.767	18	341.765		

Note. Type III Sum of Squares

Post Hoc Results for Main Effects. The Post Hoc tests of significance for the main effects were not conducted. As shown in Tables 11 and 12, the main effects progress over time (*p* = .168) and curriculum were not significant (*p* = .984). H3a and H3b were not supported for the main effects of progress over time or curriculum type.

Follow Up Interpretation of the Interaction Effect. A significant interaction was reported in Table 11, between progress over time and curriculum (F = 5.882, *df* = 2, 36, *p* = .006). Since JASP does not generate an interaction post hoc, descriptive analysis methods were used to identify performance gaps. Following the advice of Field, (2013) evidence for the location of the gaps between and among the interaction variables was reported in Figure 3 and Table 12.

Figure 3 shows that for Cohort Three, a significant interaction between progress over time and curriculum type in CA and math was found in 2012-20113, after one year of exposure to LTIS. Figure 3 does not show parallelism in the 8^{th} grade. The non-parallelism shown Figure 3 pointed to the 7th grade as the location of significant difference between student achievement scores in CA and math. Even with the potential for error, the results indicated that the standard error of the mean differences between 7^{th} and 8^{th}-grade math scores are not statistically significant because they overlap. Figure 3 shows that while 8^{th} grade CA scores increased, math scores decreased. This gap between CA and Math identifies the greatest interaction effect for progress over time and curriculum after Year 2 of implementation of the LTIS. Sixth-grade students were negatively impacted in the area of CA, and 7^{th}-grade students were negatively impacted in the area of math. Communication arts (CA) student MAP scores remained generally unchanged after Year 2 of exposure to the LTIS.

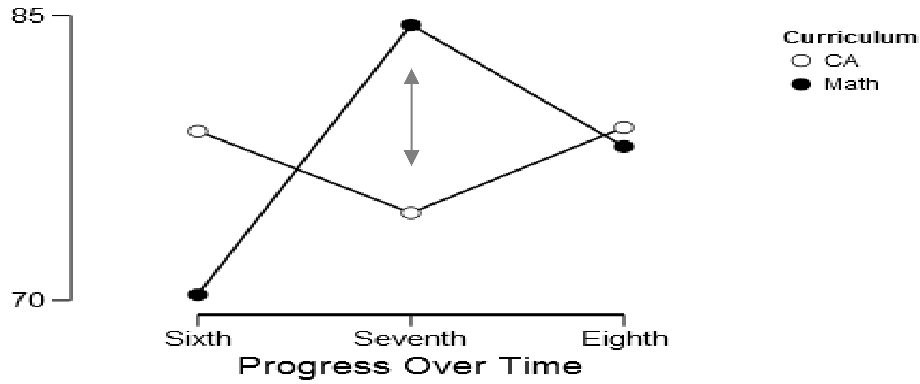

Figure 3. Comparison of cohort 3 student achievement in CA and math. Student MAP scores over time, following students for three school years. Figure 3 shows that Cohort Three student MAP scores began at a higher rate of achievement (nearing the 70% rank) than Cohort One or Cohort Two.

The x-axis indicates student MAP progress over three school years. The y-axis indicates the range of percentile MAP scores reported across the 2011-2012, 2012-2013, and 2013-2014 school years. The y-axis shows a range of student achievement levels from the 70th to the 85th percentile rank. Figure 3 illustrates the significant finding of an interaction between progress over time and curriculum.

Table 12 verified the findings reported above. Table 12 shows the descriptive statistics for Cohort Three's significant interaction between progress over time and curriculum type. Progress over time significantly interacted with curriculum type in math between seventh and eighth grades (Mean difference = -14.2). After Year 2 of exposure to the LTIS, student MAP scores in math exhibited a mean difference of -7.8 between 6th and 8th grades, while MAP scores in CA were generally unchanged. These results suggest an implementation dip from sixth to seventh grade in CA. In math, Table 12 shows that MAP scores in math rose an average of 14 points after Year 1 of exposure to the LTIS, but lost an average of 6.4 points after Year 2. By 2013-2014 eighth graders surpassed their baseline (6th grade) math MAP scores (Mean difference = 7.8).

Table 12

ANOVA Results of Interaction of Progress over Time and Curriculum Type for Cohort 3

Grade Level	Curriculum	*N*	*M*	*SD*	*MD*
6th	CA	10	78.9	12.76	*
	Math	10	70.3	13.79	*
7th	CA	10	74.6	10.78	4.3
	Math	10	84.5	13.01	-14.2
8th	CA	10	79.1	13.08	-0.2
	Math	10	78.1	12.95	-7.8

Note: MD = mean difference.

Summary

This section provided additional analyses for each cohort, which followed three cohort groups of elementary students' MAP scores in CA and math. MAP data collection began in the 2011-2012 school year during the training phase of the LTIS. MAP data were then collected over the next two academic years during the implementation of the strategy. The data were compared to determine if the LTIS caused a change in the three cohorts' academic achievement in CA and math. Figures and tables represented the findings of these analyses and the results were explained. Chapter five will provide a summary of the current study, an overview of the problem and methodology, major findings, findings related to the literature, and conclusions. It will also include implications for action and recommendations for future research.

Chapter Five

Interpretation and Recommendations

Students who struggle in communication arts (CA) and mathematics (math) need research-based instructional strategies to help them make academic gains. School districts such as District X have used the learning targets instructional strategy (LTIS) to support students who have performed poorly on high-stakes state achievement tests in an effort to bolster their skills. This chapter includes a summary of the study, a synopsis of the problem examined, the study's purpose, the research questions and hypotheses examined, the methodology, and major findings related to this research. Finally, recommendations for further research and concluding remarks are provided by the researcher to conclude the current study.

Study Summary

The current study was conducted in a small, rural K-8 school in Missouri, called District X for the purpose of this study. The study sample included a total number of 25 fourth through eighth-grade students in District X who were taught by teachers who had received training to implement the LTIS during the 2011-2012 school year. The study followed the progress of three cohorts of students over three academic years (2011-2012, 2012-2013, 2013-2014). Baseline MAP data in CA and math were collected in 2011-2012 from students who were in fourth, fifth, and sixth grades. Data were then compared to those same students over the next two years after cohort members were exposed to the LTIS. The current study focused solely on students' CA and math achievement scores. The MAP test yields Terra Nova percentile ranks in both CA and math and these scores were used to measure the change in student achievement over the three-year period in 2011-2012, 2012-2012, and 2013-2014.

The parallelism and non-parallel values for student progress show mixed results for all three cohorts. Cohorts One and Three appeared to make greater gains in CA after the second year of exposure to the LTIS. An analysis of baseline data for Cohorts One and Three also showed that student MAP achievement scores were already above the state mean (the 50^{th} percentile rank) in both CA and math, making statistical gains more difficult to achieve.

Cohort Two students' baseline data analysis showed achievement scores below the 50% percentile rank in both CA and math. Cohort Two's statistically significant increase in curricular achievement in the 2013-2014 school year may suggest that LTIS had a greater effect on lower-achieving students than on their higher-achieving peers in District X. These results are preliminary because it is more difficult to obtain statistical significance when the sample is small. Secondly, the results are less reliable because of the very large standard deviations and outliers that perhaps skewed the results.

Overview of the problem

In District X, students had experienced a gradual, steady decline in their CA and math Missouri Assessment Program (MAP) scores. Teachers in the district had implemented a variety of learning strategies to help improve student outcomes. Additionally, teachers had participated in regional professional development activities to learn research-based instructional strategies designed to help students improve their performance and help the district to maintain adequate yearly progress. After the 2010-2011 MAP scores were reported, district administrators decided to lead an initiative to implement the first school-wide teaching method referred to in the current study as the LTIS. Over the course of the 2011-2012 school year, teachers were provided with specific training to implement the five basic stages of the LTIS. All district teachers began using the LTIS in CA and math at the beginning of the 2012-2013 school year and continued with its implementation in the 2013-2014 school year. The current study sought to determine the effect that exposure to the LTIS had upon students' CA and math performance as measured by the MAP.

Purpose statement and research questions

The purpose of the current study was to explore the effect that exposure to the learning targets instructional strategy (LTIS) had upon students' MAP achievement scores in communication arts (CA) and mathematics (math), after two years of implementation. Research questions for the current study were developed to follow three same student cohort groups over three academic school years (2011-2012, 2012-2013, and 2013-2014) to determine whether the use of the LTIS, over a two-year period, effected a change in students' academic performance as measured by their MAP scores.

Review of the methodology

This was a non-experimental research study that used archival student MAP data to measure students' progress over a total of three years to determine if exposure to the LTIS had an effect on students' CA and math performance. Baseline MAP data were collected from the 2011-2012 school year for three cohort groups of students beginning in their fourth, fifth, and sixth-grade years, and then compared to MAP data generated from the 2012-2013 and 2013-2014 school years. Using JASP statistical software, two-way repeated measures ANOVA tests were used to examine the differences in the cohort group's student achievement in CA and math over time, as measured by their MAP scores, after Year 2 of exposure to the LTIS (The JASP Team, 2016).

Major findings

The results of the current study yielded mixed results. While marginally positive results were found in the all three cohort groups' CA MAP achievement scores after Year 2 of exposure to the learning targets instructional strategy (LTIS), cohorts One and Three exhibited a clear implementation dip after Year 1 of exposure to the LTIS. Overall, only Cohort Two exhibited significant academic improvement in both Communication arts and mathematics after Year 2 of exposure to the LTIS. Results for One and Cohort Three showed significant interactions between progress over time and curriculum, indicating that students performed better in one curriculum type than the other, after exposure to the LTIS. These values would also indicate that the LTIS caused inverse changes in cohort members' MAP scores due to the interaction between progress over time and curriculum.

Cohort One (across grades 4^{th}, 5^{th}, 6^{th}) and Cohort Three (across grades 6^{th}, 7^{th}, 8^{th}) showed parallel progress over time (see Figure 4), showing no significant effect from the implementation of the LTIS. Cohort Two (across grades 5^{th}, 6^{th}, 7^{th}) exhibited significantly (positive) results in progress over time according to their MAP achievement scores in both the 2012-2013 and 2013-2014 school years (see Figure 4).

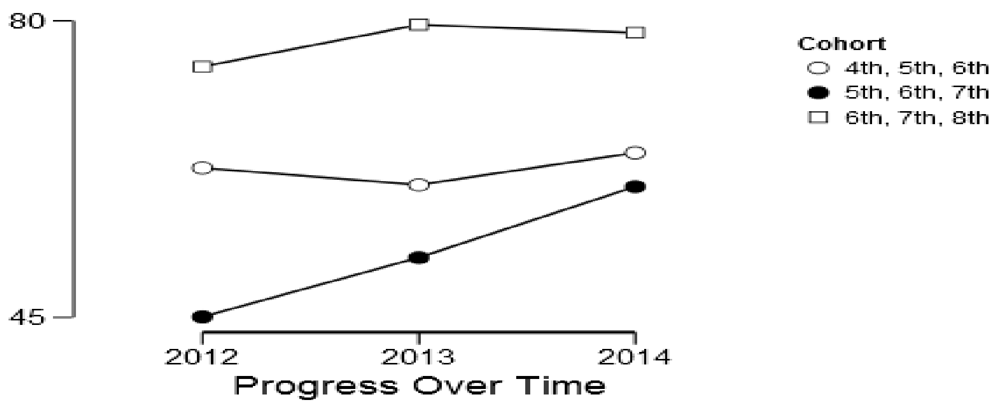

Figure 4. Summary of students (n = 25) progress over time. Figure 4 illustrates that changes in student MAP scores in CA and math for Cohort One (grades 4th, 5th, 6th) and Cohort Three (grades 6th, 7th, 8th) were not significant. Cohort Two experienced the greatest amount of growth after Year 2 of exposure to the LTIS.

In math, while there were some gains in Year 1 after exposure to the LTIS, scores for Cohorts One and Three declined after the Year 2 of exposure. Figure 5 illustrates that Cohort Two students made significant gains in math in Year 1 after exposure to the LTIS, but lost most of that gain after Year 2 of exposure to the LTIS. Cohort Three initially appeared to make marginal achievement gains after Year 1 of exposure to the LTIS (see Figure 4), results showed a relatively slight decline after Year 2 of exposure to the strategy. Figure 5 shows that for the three combined cohort groups (n = 25) results were inconsistent, yielding mixed positive and negative results for CA and math achievement, as measured by the MAP.

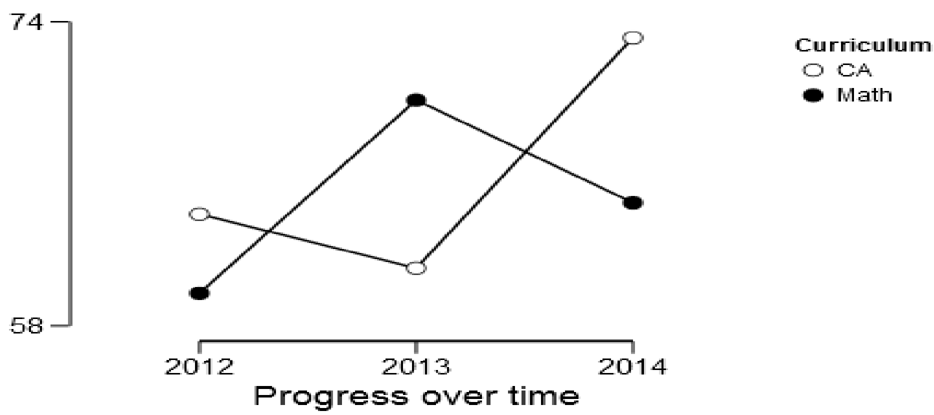

Figure 5. Combined student progress after Year 2 of implementation of the LTIS.

The x-axis shows the students' progress over a three-year period of time. Parallelism in student scores between math and CA show no significant differences between the subjects. Non-parallel values for all three cohort groups (n = 25) showed mixed results after Year 1 of exposure to the LTIS. In 2013-2014, combined student performance in CA raises significantly, while math performance declined.

Findings Related to the Literature

This section includes the current study's findings related to the literature. The review of literature revealed that many research-based strategies have the capacity to increase student performance when implemented with fidelity and profundity (Chappuis, 2005). The current study narrowed its focus to the use of only one research-based model, the LTIS. This was one of the many instructional strategies that have been studied by Hattie (2009, 2013, 2015) and been found to be effective in increasing student performance. The results of the current study, however, differ greatly from the results of Hattie's (2013) study of research-based instructional strategies. He found that the use of targeted instruction, checking for understanding, providing activities directly related to the learning target, providing multiple forms of feedback, and using the data to develop further learning targets would yield gains with effect sizes ranging from +4 to +8. Student performance in District X varied greatly between and within cohort groups. One major variance between the studies Hattie conducted and the current study was simply the number of participants, and the number of years those participants were observed. Hattie's (2015) meta-analysis of more than 1200 studies included 195 participants from a large suburban school district in New Zealand. Another major difference between these studies could be the amount and type of training teachers received prior to Hattie's (2009, 2011, 2013) studies or the skill with which the teachers implemented the new strategy. It is common for the students of a more determined teacher to exhibit greater academic outcomes (Bieg, Backes, & Mittag, 2011). It is not known which teachers in district X may have ambitiously implemented this strategy, and which may have implemented it as a means to meeting district instructional guidelines.

Conclusions

The current study evaluated how the use of the learning targets instructional strategy (LTIS) impacted a small number of students in a rural K-8 school setting. The statistical test results of the current study were largely mixed. There are implications for further study, based on the marginal gains made after the second year of exposure to the LTIS.

The current study helped to clarify the following points: 1) This initiative implemented major changes which were difficult to implement with fidelity; 2) Teachers' individual implementation of the LTIS made a difference in student outcomes, in that some acclimated to the changes more readily than others; and 3) Over the course of three years, students' academic performance generally improved in both CA and math (see Figure 6). Student progress rose

It is possible that students and teachers needed additional time to adjust to the new method of instruction (see Figure 7). It is also possible that not all teachers and students understood or utilized all the components for the strategy well, and may require additional practice to efficiently and effectively use the LTIS.

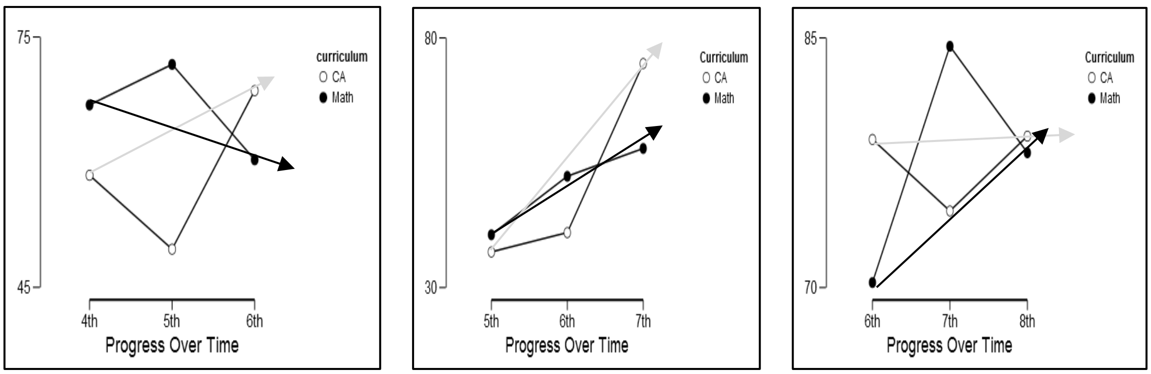

Figure 7. Combined Comparison of Cohorts' Progress Over Time.

All three cohorts experienced at least one significant change after the implementation of the LTIS. On average, cohorts experienced an implementation dip where progress declined in the first year. CA rose at a greater rate than math. Mean MAP scores generally increased from the baseline after the second year of exposure to the LTIS. Only two subgroups showed no improvement. In Cohort One, 6th grade math scores declined and fell below baseline scores after the second year of exposure to the LTIS. In Cohort Three, after experiencing an implementation dip in 7th grade, 8th grade CA scores rebounded to scores nearly equal to baseline scores and therefore remained generally unchanged.

According to change theory, an implementation dip (an initial drop in performance) after the first year of exposure to a new initiative such as the LTIS, can be expected (Fullen, 2011). This phenomenon appeared to be true for District X. Values in Figure 6 show evidence of an implementation dip after the first year and second years of exposure. Cohort One (across 4^{th}, 5^{th}, and 6^{th} grades) exhibited math scores which initially increased after the first year of LTIS implementation, but declined in the second year. However, in CA, Cohort One scores sharply declined after the first year of LTIS implementation, and then rebound to exceed their scores from both fourth and fifth grades. This indicates that changes in the teacher's understanding and usage of the LTIS may have contributed to the differences in student performance. On average, the LTIS appeared to yield mixed results for Cohort One.

Cohort Two made no significant changes in progress after one year of exposure to the LTIS. Figure 7 also illustrates that after two years of exposure to the LTIS, there was a significant increase in progress over time for Cohort Two. There is an indication that a change in teacher presentation and usage of the LTIS may have had an effect on student outcomes. In general, the LTIS appeared to make a positive difference for Cohort Two.

Cohort Three experienced an implementation dip in both CA and math. Students' scores declined more sharply in math than in CA. Cohort Three's scores in math recovered and made additional gains after the second year of exposure to the LTIS, while CA scores declined further. As shown in Figure 7, statistical testing for Cohort Three yielded mixed results after two years' exposure to the LTIS.

Implications for action

Classroom teachers are expected to provide a high-quality education for all students, regardless of extenuating circumstances or handicapping conditions. Teachers are being required to implement research-based instructional strategies as a way to improve student achievement, oftentimes as part of a district-wide initiative. The use of learning targets is one such strategy that some schools have found to be highly effective in raising student achievement (Moss & Brookhart, 2012).

Study results indicated that using learning targets in the classroom for a two-year period had a significantly positive effect on only one of the three cohorts' progress over time. Schmoker (2011) maintained that teachers and students could rarely state what students were supposed to be learning in any given classroom without clearly defined learning targets. Schmoker (2011) maintained the idea that clearly-defined and well-planned learning targets are essential components of an effectively presented lesson. Therefore, while establishing and using learning targets may be one way to increase student achievement scores, more time to study its effects would be needed to accurately determine their value in District X. Teachers and students included in the current study needed an initial year to adjust to the new initiative. It is also difficult to gauge teachers level of commitment to this initiative in order to ensure it is implemented with fidelity. Teachers may require additional support and practice to become efficient and effective in the implementation of the LTIS. Fullen (2011) suggests that educators be aware of how major changes to the culture may affect student progress and teacher morale. He urges school leaders to remember that, "new skills and understanding have a learning curve" (p. 71). Helping the staff to increase awareness and understanding of the implementation dip could help restore their enthusiasm for the initiative in District X.

Administrators should be encouraged to take the time to collect and analyze data, regroup when needed, and to celebrate the small successes along the way. In District X, teachers could reflect on the progress that has been made, clarify goals for the future, and celebrate the small successes that are illustrated in Figure 6.

Leaders should be reminded to give full support and encouragement to staff members and not to abandon the new initiative too quickly. Change takes time and big changes take even longer. Support may be offered in a variety of ways, such as joining in on planning meetings, recognizing individual members for a job well-done, or modeling what the initiative should look like. Most importantly, school leaders should recognize that implementation dips are normal, and should continue to pursue the initiative (Fullen, 2011). This is encouraging news for District X.

School building and district level administrators play a vital role in setting the standards for successful school practices (Marzano & Toth, 2013). They are tasked with developing programs for staff and students that will provide the best learning environments and assure student success. They are further held accountable for guiding all students towards college and career readiness by graduation. To govern a multifaceted body of students successfully, administrators must make sound decisions and determine which practices and procedures will truly increase student achievement. Moreover, they are responsible for building a culture which grows the teaching capacity of their staff and provides professional development activities that incorporate researched based instructional strategies to drive learning forward. School leaders in District X can benefit from understanding more about the concept of the LTIS, as well as the other researched based strategies discussed in the current study. It may enhance the decision-making processes which are in the best interest of students and staff members.

Recommendations for future research

The purpose of the current study was to explore the effect that the learning targets instructional strategy (LTIS) had upon students' CA and math MAP scores, after two years of implementation. The current study analyzed the MAP scores for three cohort groups of students over a three-year period (2011-2012, 2012-2013, 2013-2014). The results of the current study highlight the need for further evaluation in multiple areas. Further study is needed on research-based instructional strategies to increase student outcomes in these critical areas. Since significant achievement gaps continue to exist in District X in the areas of CA and math, the current study could serve as the pilot study upon which to build.

The first recommendation for further study would be to lengthen the study time to improve the reliability of the data generated. Another recommendation for further study would be to include a larger sample population to provide a broader foundation from which to generate data and study the effects of the LTIS in District X. This could be accomplished by including all students who participate in the MAP test in 3rd through 8th grades. A final recommendation for further study would be to use a control group from a neighboring rural school of similar size and composition, from which to compare the data in a pre-test/posttest design. Since the current study generated data from a very limited sample population and for short duration, increasing both could lend greater insight into the actual value of the LTIS's effect on academic outcomes. Also, increasing the sample size to include all MAP test participants, repeating the study over several years, and including other schools that are currently using the LTIS might yield more reliable and valid results. Therefore, the results of a longitudinal study following the entire school population during the continued use of the LTIS could yield more conclusive results. For District X, results of this study could aid administrators in making sound educational decisions for the district and its teachers.

Concluding remarks

The primary purpose of the current study was to determine whether the implementation of the learning targets instructional strategy (LTIS) was positively impactful to students' academic achievement scores, thus improving the efficacy of their educational experience. The results of the current study revealed some significant gains over the two years of their implementation for only one of the three cohorts. However, perhaps more importantly, the cohort showing statistical academic progress was initially the poorest performing cohort. The work of Fullen (2011) reminded administrators and teachers that it is common to experience implementation dips when introducing major changes to the district's curricular instructional models. Moreover, the results from the current study's hypotheses testing indicated that for all three cohorts, students performed marginally better at the end of the second year of exposure to the LTIS. Per Fullen's recommendations, District X will need to continue with this initiative and collect further data to adequately evaluate the initiative's potential. Therefore, while the results were mixed, it is not without value. The current study can lend itself as a foundation from which District X can begin to build a larger body of knowledge and an impetus for further study.

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Appendices

Appendix A: Request to Collect MAP Data

January 15, 2017

RE: Internal Request for Data Collection

Dear Mr. X.,

I am writing to formally request permission from the School Board to collect archival MAP data from the testing coordinator, as well as MO SIS data from the central office in order to complete my study on the effects that learning targets have had upon our students' communication arts and mathematics achievement scores. If granted, please be assured that no personally identifiable information will be used in the study. The information will be stored in a secured place and all data will be destroyed at the completion of this study. Thank you for your help and support of my doctoral journey, as it has been most appreciated.

Respectfully,

Kathryn A. Anderson

Kathryn A. Anderson, Doctoral Candidate, Baker University

Appendix B: IRB Form

Date:

SCHOOL OF EDUCATION IRB PROTOCOL NUMBER ________________

GRADUATE DEPARTMENT (IRB USE ONLY)

IRB REQUEST

Proposal for Research

Submitted to the Baker University Institutional Review Board

I. Research Investigator(s) (Students must list faculty sponsor first)

Department(s) **School of Education Graduate Department**

Name Signature

1. __Dr. Kokoruda_______, Major Advisor

2. __Dr. Li Chen-Bouck____ Research Analyst

3. ________________________ University Committee Member

4. ________________________ External Committee Member

Principal Investigator: Kathryn A. Anderson

Phone: (660)885-1335

Email: KathrynAAnderson@stu.bakeru.edu

Mailing address: 1014 SE Hwy. 7, Clinton, MO 64735

Faculty sponsor:

Phone:

Email:

Expected Category of Review: _X_Exempt ___ Expedited _ __Full

II: Protocol: (Type the title of your study)

Learning Targets Instructional Strategy and Missouri Assessment Program Scores in Communication Arts and Mathematics.

Summary

In a sentence or two, please describe the background and purpose of the research.

A small, rural school continued to experience a significant decline in the Missouri Assessment Program (MAP) scores from 2010 to 2013, in communication arts and mathematics. To address this need, and increase academic progress as mandated by No Child Left Behind legislation, this district adopted a school-wide initiative and implemented the Learning Targets instructional strategy.

Briefly, describe each condition or manipulation to be included within the study.

There are no conditions or manipulations in this study.

What measures or observations will be taken in the study? If any questionnaire or other instruments are used, provide a brief description and attach a copy.

Archival MAP data describing student progress in communication arts and mathematics, for the years spanning 2010 to 2014, will be utilized for this study.

Will the subjects encounter the risk of psychological, social, physical, or legal risk? If so, please describe the nature of the risk and any measures designed to mitigate that risk.

Subjects of this study will not encounter any psychological, social, or legal risk.

Will any stress to subjects be involved? If so, please describe.

There will be no stress to the study subjects involved in the investigation.

Will the subjects be deceived or misled in any way? If so, include an outline or script of the debriefing.

No, will the subjects be deceived or misled in any way.

Will there be a request for information which subjects might consider to be personal or sensitive? If so, please include a description.

No personal or sensitive subject information will be requested.

.

Will the subjects be presented with materials which might be considered to be offensive, threatening, or degrading? If so, please describe.

The subjects will not be presented with any materials which might be considered offensive, threatening, or degrading.

Approximately how much time will be demanded of each subject?

Because this study will only utilize archival MAP data, there will be no time demanded of subjects.

Who will be the subjects in this study? How will they be solicited or contacted? Provide an outline or script of the information which will be provided to subjects prior to their volunteering to participate. Include a copy of any written solicitation as well as an outline of any oral solicitation.

The subjects will be all the district participants of the MAP test, in grades three through six, including Title I participants and students who have Individual Educational Plans in communication arts or mathematics.

What steps will be taken to ensure that each subject's participation is voluntary? What if any inducements will be offered to the subjects for their participation?

No active participation will be required, as this study uses only archival data.

How will you ensure that the subjects give their consent prior to participating? Will a written consent form be used? If so, include the form. If not, explain why not.

No consent will be required, as this study uses only archival data

Will any aspect of the data be made a part of any permanent record that can be identified with the subject? If so, please explain the necessity.

No aspect of the data will be made a part of any permanent record that can be identified with the subject.

Will the fact that a subject did or did not participate in a specific experiment or study be made part of any permanent record available to a supervisor, teacher or employer? If so, explain.

Archival data will not require any voluntary participants. Therefore, no part of this study can be made a part of a permanent record available to a supervisor, teacher, or employer.

What steps will be taken to ensure the confidentiality of the data? Where will it be stored? How long will it be stored? What will be done with it after the study is completed?

The district's MAP coordinator has assigned a number to replace the names of all study subjects, to maintain their confidentiality. Furthermore, the research analyst and I will keep all generated statistics and data confidential. The data will be stored in a singular computer file for one year, and then destroyed after the study has been completed.

If there are any risks involved in the study, are there any offsetting benefits that might accrue to either the subjects or society?

While there are no risks associated with this study, there may be an offsetting benefit. If the study finds a significant correlation between the implementation of the Learning Target instructional strategy and a rise in the communication arts MAP scores, the students will have benefited from an increased educational opportunity presented by this teaching methodology.

Will any data from files or archival data be used? If so, please describe.

Yes, archival MAP data from the years 2010, 2011, 2012, 2013, and 2014 will be used.

I will be examining the scores from three years prior to the implementation of the Learning Targets instructional strategy (2010-2012) and comparing them to the district's first three years (2013-2015) of the district-wide implementation of this instructional strategy. I hope to determine if there was a difference academic achievement, specifically in communication arts and mathematics scores, as measured by the MAP test, for all district students in grades three through eight who participated in the test

Appendix C: Baker Letter of Approval

BAKER UNIVERSITY
1858 Own Confidence

Baker University Institutional Review Board

February 2, 2017

Dear Kathryn Anderson and Dr. Kokoruda,

The Baker University IRB has reviewed your research project application and approved this project under Exempt Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in the original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.

Please inform this Committee or me when this project is terminated or completed. As noted above, you must also provide IRB with an annual status report and receive approval for maintaining your status. If you have any questions, please contact me at EMorris@BakerU.edu or 785.594.7881.

Sincerely,

Erin R. Morris

Erin Morris PhD
Chair, Baker University IRB

Baker University IRB Committee

Joe Watson PhD
Nate Poell MA
Susan Rogers PhD
Scott Crenshaw

Appendix D: Leesville R-IX School Board Letter of Acceptance

Phone: Fax:

February 24, 2017

Dear Ms. Anderson,

Superintendent X and XXXXXX School Board met in special session last night to discuss your request for data. We have reviewed your university's IRB document and I am pleased to inform you that the unanimous decision was to support you in your educational journey. The central office will supply any archived MAP data information you will need to conduct your study. The board further requested that student numbers be assigned to your subjects, and no student names or personally identifying information be used in your study. The testing coordinator may be able to assist you in collecting archived MAP data, and Central office may assist you in collecting the core data information you have requested.

Additionally, the district is very interested to know the outcome of this study, since Learning Targets have become a primary instructional strategy in our school and many other surrounding schools as well. We appreciate all you are doing to further the cause of education and wish you the best in your educational endeavor. If you are in need of any further assistance, please do not hesitate to request it from the central office staff.

Best regards,

XXXX, Board Secretary