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An Examination of Academic Growth in Middle School Students Receiving Tier 3 Instruction and Teacher Perceptions Regarding Mindset

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Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

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Abstract

Existing research on the implementation of RTI and growth mindset practices at the secondary level was sparse, despite the literature on the challenges facing the middle school structure and best practices for adolescent learners. This quantitative study added to the body of research by examining components of each effort in an urban school district. The researcher compared the academic growth of middle school students who received Tier 3 instructional support in reading or math to the academic growth of students who did not receive Tier 3 support. The data revealed no significant difference between the growth of the two groups. As a result, the researcher recommended a deep and bold examination of the existing practices and structures of the RTI program in the researched school district to ensure the identification of students, resources used, and processes for adjusting support was appropriate for adolescent learners and the middle school setting. The study included a look at academic growth across the middle grades, but the data showed no difference. The researcher discussed the implications of adolescent growth patterns on learning as connected with the data. In regard to fostering growth mindsets, middle school ELA and math teacher survey results showed awareness of the benefits of fostering a growth mindset in the classroom but limitations to existing teacher knowledge and skills. The researcher recommended supporting teachers in delivering feedback to students focused on effort over ability, a strategy shown to increase student learning.

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Chapter One: Introduction

Introduction

School administrators and teachers in the United States experienced increased accountability for student outcomes when the President signed into law the No Child Left Behind Act of 2001(NCLB); later replaced by the Every Student Succeeds Act (ESSA) in 2016. Both documents included statements focused on the opportunity for all children to be proficient or better on the learning standards of the state of residency (Every Student Succeeds Act [ESSA], 2015; No Child Left Behind [NCLB], 2001). NCLB and ESSA referenced Multi-Tiered Systems of Support (MTSS) as a method for providing appropriate supports for students with varying academic, social, and emotional needs. ESSA included the approval of the use of federal funds to support implementation of MTSS. Individuals who implemented Response to Intervention (RTI), one MTSS framework, aimed to integrate assessment with targeted interventions to maximize student achievement and reduce behavioral problems (National Center on Response to Intervention [NCRI], 2010). RTI implementation gained traction in the mid-2000's leading to a total of 47 states advocating for districts to implement RTI by 2010 (Hughes & Dexter, 2011).

As the academic accountability of school districts increased, Carol Dweck's works on mindsets emerged and started receiving attention in the field of education (Bean & Ippolito, 2016; Dweck, 2012; Ricci, 2017). Dweck (2012) described mindsets as the beliefs people held about the nature of human attributes, including intelligence. A person who held a fixed mindset believed human attributes could not change over time. By contrast, a person who held a growth mindset believed human attributes could change

through efforts and experiences (Dweck 2012). Most of the current research on mindsets in education focused on the mindsets of students (Chapman & Mitchell, 2018; Pueschell & Tucker, 2018; Snipes & Tran, 2017). Little information and research explored teacher perceptions of mindset (Yettick et al., 2016).

Statement of the Problem

In the state of Missouri, the use of the RTI model started after the Missouri Department of Elementary and Education (MODESE) provided guidelines for district implementation (Missouri Department of Elementary and Secondary Education [MODESE], 2008). Administrators and teachers within districts using the RTI model established essential components, including a school-wide, multi-level instructional and behavioral system, universal screening practices, and a data-based decision-making process for instruction, movement within the multi-level system, progress monitoring, and disability identification (NCRI, 2010). The highest level of support, at the time of the study, was known as Tier 3 instruction. Tier 3 instruction was the most intense level of a multi-level prevention system, consisting of individualized, intensive intervention(s) for students who had severe and persistent learning or behavioral needs (Center on Multi-Tiered System of Supports [CMTSS], 2021a). All educators connected to the RTI process knew basic information about the process and worked hard to support students in Tier 1, Tier 2, and Tier 3 instruction. However, student outcomes did not show the student growth over time, called for in the state accountability plans (MODESE, 2018a). Educators noted a lack of progress in meeting standards of proficiency, particularly at the middle school level, and started calling for a closer examination of RTI and student outcomes at the middle school level.

Historically, the national data on student achievement in grades six, seven, and eight showed a decline without a clearly identified reason (Rockoff & Lockwood, 2010). One researcher found an association between student motivation and grades. Seventh-grade students who believed in a fixed mindset produced declining grades, while peers with a growth mindset showed an increase in grades (Dweck, 2007). In the 2006 book, *Mindset: The New Psychology of Success*, Carol Dweck wrote about a connection between the messages students received from adults and the mindset students held. Additional research showed teachers' beliefs about mindset, fixed or growth, influenced the support offered to students during instruction (Gutshall, 2013). The combination of Missouri student achievement data, which mirrored the national trends, and the findings in mindset research led the researcher to explore the relationship of teacher mindset on student achievement in grades six, seven, and eight.

Background of the Study

The site for the study was a school district in an urban area of Missouri. The district had a total enrollment of approximately 6,300 students spread across six elementary schools, two middle schools, one high school, and a tuition-based school for early childhood with a diverse student population (Researched School District, 2020, p. 3). According to the district's 2019-2020 annual report the district's student population was 41% African American, 0.2% Native American, 1.6% Asian, 22.8% Hispanic, 8.5% Multi-Racial, and 25.9% White (Researched School District, 2020, p. 3). The Missouri Comprehensive Data System reported the free and reduced lunch population percentage at 100% (Missouri Comprehensive Data System [MCDS], 2021). The report also included data comparing some district outcomes to the outcomes of the state of Missouri.

The district reported lower results than the state in the areas of four- and five-year graduation rates, entrance of students into post-secondary educational settings, and composite ACT scores (Researched School District, 2020, p. 3).

In addition to the demographic and graduation information, the researcher discovered the use of RTI processes and support. Members in the researched school district created a Multi-Tiered System of Support Response to Intervention plan, aimed at responding to data showing large numbers of students not at proficiency in reading and math (Researched School District, 2020, p. 4). The researcher reviewed the academic achievement data and found a decline in the percentage of students scoring advanced or proficient on the state administered standardized tests. According to the public 2019 MSIP5 District/Charter APR Supporting Data Report, student academic achievement in English Language Arts (ELA) dropped from 46.9% to 34.2% in 2017-2019. Student achievement in mathematics dropped from 32.8% to 28.2% in 2017-2019 (MCDS, 2019, p. 1). The report also included the academic achievement of students in reported subgroups. The subgroup achievement included students who received free/reduced priced lunch: African American and Hispanic students, English Language Learners, and students with disabilities (MODESE, 2018a). The data trend for subgroup achievement in ELA also showed a decline from 2017 to 2019; however, the decline was less than the decline in the data for all students. For math, the subgroup achievement data did not decline, but rather remained steady at around 28% from 2017 to 2019 (MCDS, 2019, p. 1).

Purpose of the Study

Fuchs et al. (2010) proposed RTI practices during implementation at the elementary level may need to be adjusted for implementation at the secondary level. The purpose of the study was to investigate a possible difference between the academic growth of students who received Tier 3 instruction at the middle school level and a statistically like group of students who did not receive Tier 3 instruction, as measured by curriculum-based measurements. The ELA curriculum-based measurements used in the study were FastBridge aReading and CBM-Reading and the Evaluate Benchmark assessment for ELA. For math, the researcher used FastBridge aMath and CBM-Math Process and the Math Evaluate Benchmark assessment. The specific feature of RTI and Tier 3 the researcher reviewed was the measures of responsiveness at the secondary level. The study results could be used to review processes around Tier 3 instruction in middle schools.

The researcher also investigated a possible relationship between teacher perceptions of mindset, including classroom practices, and the academic growth of middle school students. The participants in the study completed a survey measuring teacher perceptions of mindset and classroom practices that did and did not foster a growth mindset. The researcher compared survey results for ELA teachers and Math teachers with the academic growth of students by grade level. The grade levels investigated in the study included sixth, seventh, and eighth grade. The results of analyzing the teacher survey information and student academic growth could inform recommendations for addressing teacher perceptions of mindset at the middle school

level, including professional development needs, teacher growth opportunities, and coaching conversations to support student growth.

Null Hypotheses

Null Hypothesis 1: There is no difference in the academic growth of students who received Tier 3 instruction in reading and a statistically like group of students who did not receive Tier 3 instruction in reading.

Null Hypothesis 2: There is no difference in the academic growth of students who received Tier 3 instruction in math and a statistically like group of students who did not receive Tier 3 instruction in math.

Null Hypothesis 3: There is no relationship between the English Language Arts academic growth of sixth-grade students and the perceptions of mindset of English Language Arts teachers.

Null Hypothesis 4: There is no relationship between the Math academic growth of sixth-grade students and the perceptions of mindset of Math teachers.

Null Hypothesis 5: There is no relationship in the English Language Arts academic growth of seventh-grade students and the perceptions of mindset of English Language Arts teachers.

Null Hypothesis 6: There is no relationship in the Math academic growth of seventh-grade students and the perceptions of mindset of Math teachers.

Null Hypothesis 7: There is no relationship in the English Language Arts academic growth of eighth-grade students and the perceptions of mindset of English Language Arts teachers.

Null Hypothesis 8: There is no relationship in the Math academic growth of eighth-grade students and the perceptions of mindset of Math teachers.

Rationale

The implementation of RTI at the middle school level worked under certain assumptions applicable to the elementary level but could be misapplied at the middle school level (Fuchs et al., 2010). The assumptions informed important decision-making points in selecting students for Tier 2 or Tier 3 instruction, determining responsiveness to interventions, and methods for addressing gaps in student skills (Fuchs et al., 2010). As noted by Ciullo et al., insufficient research existed regarding implementation of RTI at the middle school level (2016). The focus of current research was how RTI addressed the needs of struggling elementary readers and did not address math (Dalcourt, 2014; Faggella-Luby & Wardell, 2011; Gersten et al., 2017; Pyle, & Vaughn, 2012; Roberts et al., 2013). Current research was also limited in the experience of the schools in implementing RTI beyond four years. The case study completed by Johnson and Smith (2011) followed the first four years of RTI implementation, specifically professional development, and support. According to the district's Department of Data and Assessment, RTI implementation began approximately 10 years before the study began, with limited ongoing professional development (District Administrator, personal communications, February 9, 2018). The purpose of Tier 3 instruction was to remediate existing problems and prevent further deficits from developing as a result (Ervin, 2009). In the researcher's experience, students who received Tier 3 instruction continued to fall behind peers who did not receive Tier 3 instruction. The researcher in the study examined RTI instruction, specifically a difference in two statistically like groups of students; one

group who received Tier 3 instruction, and another group who did not receive Tier 3 instruction at the middle school level in reading and math. Level, content, and experience were factors in the study missing from existing research.

The researcher also investigated possible relationships in student academic growth by grade level and content while considering teacher perceptions of mindset and perceptions of classroom practices fostering a growth mindset. The Education Week Research Center conducted a nationwide study of K-12 teachers investigating teacher views and experiences connected to mindset (Yettick et al., 2016). The study extended the work of the authors by slightly altering the tool and narrowing the range of responses. The initial study gathered responses from K-12 teachers, instructional specialists and coaches, and special education coordinators. Teachers surveyed for the study taught middle school math or ELA. The responses were sorted by grade and content area and paired with academic growth by grade level and content. Investigation of a possible relationship between the two factors did not exist in the research. Much of the current research centered on student perceptions about mindset (Claro et al., 2016; Dweck, 2008; Yettick et al., 2016). The researcher was unable to find studies on teacher mindset outside of specific groups or scenarios, such as students with disabilities and tracked students and a focus on the influence of teacher feedback on student mindset (Gutshall, 2013; Seaton, 2018; St. Amant, 2017). The closest works uncovered in the literature were a 2017 and a 2018 study on the influence of teacher mindsets on the feedback provided on student work and student response to teacher feedback (Kraker-Pauw et al., 2017; Seaton, 2018).

Definition of Terms

Academic growth: A change in student achievement for an individual student between two or more points in time. Also referred to as student growth (MODESE, 2013).

Curriculum-based measurement (CBM): A measurement approach used to screen students or to monitor student progress in mathematics, reading, writing, spelling, and other content areas. Educators used the results to assess individual responsiveness to instruction, including decisions for secondary and tertiary results. Curriculum-based measurements differ from curriculum-based assessments due to three additional properties: (1) Each CBM test was an alternate form of equivalent difficulty; (2) CBM measures were overall indicators of competence in the target curriculum; and (3) CBM was standardized, with its reliability and validity well documented. These properties allow teachers and schools to look at student growth over time (NCRI, 2014).

Evaluate Benchmark Assessment: An assessment taken through an internet-based system that provided immediate results of student progress towards end of the year standards in English Language Arts and math. New assessments for grades 2 through 12 were posted monthly throughout the school year. Students participated in eight unique assessments during the year as the first two assessments of the year were given again at the end of the year (Catapult Evaluate, 2016).

FastBridge Assessment: Curriculum-based measurements for reading and math blended with computer-based assessments. Assessments used by the study site include: (1) Adaptive Reading (aReading) a computer-administered adaptive measure of broad reading to assess a variety of skills including concepts of print, phonemic awareness,

phonics, comprehension, and vocabulary (Illuminate Education, 2021b). (2) Curriculum-Based Measurement for Reading (CBM-Reading) an evidence-based, one-minute assessment used for universal screening to help identify students at-risk for academic failure (Illuminate Education, 2021b). (3) Adaptive Math (aMath) a fully automated computer adaptive measure of broad math skills, including counting and cardinality, operations and algebraic thinking, number, and operations in base 10, numbers and operations, measurement and data, and geometry (Illuminate Education, 2021a). (4) Curriculum-Based Measurement for Math Process (CBM-Math Process) a group-administered assessment to assist teachers in understanding a students' strengths and areas of difficulty when computing math problems (Illuminate Education, 2021a).

Mindset: Mindsets were the beliefs people hold about the nature of human attributes, including intelligence. A person who held a fixed mindset believed human attributes could not change or be altered over time and a person who held a growth mindset believed human attributes could change through efforts and experiences (Dweck, 2012).

Missouri Department of Elementary and Secondary Education (MODESE): The agency that oversaw elementary and secondary education in the state of Missouri and supported school districts in preparing all students for success after graduation (MODESE, 2018b)

Purposive sampling: Selecting a sample population, using prior information, to obtain information for the specific purpose of the study (Fraenkel et al., 2019).

Response to Intervention (RTI): A multi-level prevention system of assessment and intervention to maximize student achievement and to reduce behavioral problems (NCRI, 2010).

Tier 1 instruction: The first level in a multi-level prevention system; commonly referred to as the primary prevention level. Tier 1 consisted of a high-quality core curriculum and research-based instructional practices to meet the needs of most students (NCRI, 2014).

Tier 2 instruction: The second level of intensity in a multi-level prevention system; commonly referred to as the secondary prevention level. Interventions occurring at the secondary level were evidence-based and addressed the learning or behavioral challenges of students identified as at risk for poor learning or behavioral outcomes (NCRI, 2014).

Tier 3 instruction: The most intense level of a multi-level prevention system; commonly referred to as the tertiary prevention level. Instruction consisted of individualized, intensive intervention(s) for students who had severe and persistent learning or behavioral needs (NCRI, 2014).

Limitations

The study included limitations. Attendance and enrollment of students in the population varied over the course of an academic year. Studies stated attendance influenced student academic performance (Gottfried, 2010). The specific purpose of the study was to look at a possible relationship between Tier 3 instruction and academic growth in students, not the relationship between academic growth and attendance. One limitation to the study was obtaining a sample representative of the population of students

receiving Tier 3 in reading or math. Students needed an attendance rate of 90% or better to be a part of the sample. The researcher selected the 90% attendance criterion based on the MODESE expectation for school districts to sustain an attendance rate of 90% of students with an attendance rate of 90% or above (MODESE, 2018a).

Limitations also existed for the mindset portion of the study. Teachers were sent an email invitation to complete the mindset survey online. A district administrator reported lower than desired return rates on requests for teacher feedback, such as PD surveys, needs assessments, and even input for school supply lists (District Administrator, personal communication, September 20, 2019). The researcher found several reasons why survey completion was a struggle: the first being time. Teachers had a large list of tasks to finish, and the consequences of not completing a survey were minimal when looking at the results of not finishing some other responsibilities. Another reason was that teachers received multiple surveys simultaneously during certain times of the year, including PD surveys from the building and the district, a communications survey from the district, and various surveys needed for supporting students.

In addition, the willingness of teachers to complete the survey varied based on perceptions held regarding the researcher. The role of the researcher was not connected to teacher evaluation, but misconceptions were possibly held by potential participants. The misconceptions could have created fears of who would see the survey results and possible results from responses. A teacher who held a misconception could have chosen not to respond or to alter the responses provided.

Lastly, the onset of the COVID-19 pandemic in March 2020 interfered with the data collected for the study. The researcher planned to use secondary data from

assessments scheduled for administration in April and May of 2020. Students and staff at the researched school district transitioned to virtual instruction on March 18, 2020, and remained virtual for the rest of the 2019-2020 school year. There should have been an Evaluate test in April of 2020 and a third administration of the FastBridge assessments in May.

Summary

The RTI framework provided a structure for educators to respond to the varying academic needs of learners (ESSA, 2015; NCLB, 2001). The work around mindset, specifically holding views of growth mindset over a fixed mindset, also aimed to support students towards improved learning outcomes (Yettick et al., 2016). Research existed on both topics but failed to consider all lenses available. After years of implementing the RTI model at the middle school level, the time had come to determine if there was a difference in the academic growth of students who received Tier 3 and those who did not. The relationship between teacher perceptions of mindset and classroom practices and student academic growth also needed to be explored.

In Chapter Two, the researcher examined existing research and data. Topics included RTI, the middle school concept, the adolescent learner, and the application of mindset in the educational setting. The researcher had applicable student achievement data as well.

Chapter Two: Review of Literature

Introduction

The researcher conducted a literature review related to the Response to Intervention (RTI) framework, the middle school concept and adolescent learner, and the application of mindset in the educational setting. Each of the topics provided context and had a direct connection to the purpose of the study. The researcher also provided information on the common thread for all the above topics; the federal policy focused on improving academic outcomes for all students. In addition, a summary of the published research on the topics outlined the existing gaps in the literature the study sought to fill.

A common thread across all hypotheses in the study was the topic of academic achievement. Student achievement had become an intense focus of federal and local mandates over the last 20 years. The No Child Left Behind Act of 2001 (NCLB), a landmark federal law, reauthorized the Elementary and Secondary Education Act (ESEA) and intended to improve America's elementary and secondary schools while increasing choices for parents with students attending failing schools (U.S. Department of Education [USDE], 2001). One of the main strategies of the law included increased accountability on states, school districts, and schools through annual testing for all students in grades three through eight in the areas of reading and math, based on challenging state standards. Annual progress objectives outlined Adequate Yearly Progress (AYP) expected year over year, ensuring all students reached proficiency within 12 years (USDE, 2002). By 2005, evidence of schools' inability to keep up with the progress objectives led to offering states flexibility from parts of the law if proof of increased student achievement existed. The flexibility continued through waivers during the Barack Obama administration, as work

to replace NCLB occurred from 2010 until the Every Student Succeeds Act in 2016 (Klein, 2020).

The Every Student Succeeds Act (ESSA) rolled back a significant portion of federal control on educational policy and shifted more decision-making power to the state level. Concerning academic accountability, states submitted plans outlining long-term goals and aligned interim goals to address graduation rates, student proficiency on tests, and English-language proficiency (Klein, 2020). The aim of NCLB to close achievement gaps across groups (race, poverty, ethnicity, disability, limited English proficiency) was also a key component of ESSA. Provisions of the law included continued accountability for America's disadvantaged and high-need students and an expectation that states acted to increase student achievement in low-performing schools. ESSA reauthorized ESEA with amendments built on lessons learned from NCLB, yet maintained the goal of ensured success for students leaving high school prepared for college and careers (Every Student Succeeds Act [ESSA], 2015).

Response to Intervention

The use of RTI in schools gained traction following the signing of NCLB in 2002, and by 2009, 47 of 50 states in the United States developed state plans or models for local school districts (Hughes & Dexter, 2011). The endorsement of RTI in the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA) established a method of learning disability identification contrary to the historical use of intelligence quotients and standardized achievement tests (Lopuch, 2018). In addition to the IDEA endorsement, research from the National Reading Panel in 2000 and a report from the

National Research Council on Minority Students in Special and Gifted Education further encouraged using the RTI model (Addison & Warger, 2011).

RTI was a multi-level prevention system of assessment and intervention to maximize student achievement and reduce behavioral problems (National Center on Response to Intervention [NCRI], 2010). At the time of the study, the Center on Multi-Tiered System of Supports (CMTSS), formerly known as the National Center of Response to Intervention, continued to rely on the 2010 document, "Essential Components of RTI-A Closer Look at Response to Intervention," as the resource for the definition and essential components of RTI (Center on Multi-Tiered System of Supports [CMTSS], 2021a). The document identified the critical components of a school-wide, multi-level instructional and behavioral system for preventing school failure, universal screening for all students, progress monitoring, and the use of data-based decision making for instruction, movement within the multi-level system, and disability identification (NCRI, 2010).

Data-Drive Decision Making

While the implementation of leveled instructional support for all students aimed to address the academic needs of students, educators relied on the use of a data-driven decision-making (DDDM) process to inform the day-to-day work of selecting targeted supports for students. In 2019, Wang summarized the work of Mandinach, Honey, and Light (2006) into a description of DDDM as the following six step process:

> (1) collecting and (2) organizing raw data which can be converted into information; (3) analyzing and (4) summarizing information which can be transformed into usable, applicable knowledge; (5) synthesizing and (6)

> prioritizing the information to develop a set of options from which decision-makers select a choice and reach a decision. (p. 2)

Provost and Fawcett provided a more concise description in 2013 when referencing DDDM as the practice of basing decisions on the analysis of data over basing decisions solely on intuition. Educators had an increased need to rely on objective evidence over anecdotes following NCLB and continuing with ESSA. Data was more definitive in supporting or changing practice than anecdotal information (Mandinach & Jackson, 2012). When applied to the RTI framework, DDDM involved all six-steps and occurred across multiple levels of the process.

Designing and implementing a method for using student data to make decisions was pivotal to the success of RTI (NCRI, 2013). In the state of Missouri, a school district implementing RTI for determining a student's learning disability status and eligibility for special education services had to have a written policy. The written policy had to outline criteria for identifying students needing an additional tier of support, the number of interventions, intervention sessions, the frequency and duration of progress monitoring, and criteria for determining a student's responsiveness to intervention (MODESE, 2008). Howell et al. advocated for a process that began with identifying the root cause of the matter (2008). Teams should have examined data collected through the universal screener and other applicable data to articulate the reason for the student's poor academic performance or behavior. Once the team identified a possible root cause, the team developed an intervention plan, implemented the intervention, monitored progress in response to the intervention, and reviewed the data (Howell et al., 2008). The team engaged in the cycle for each student and determined if Tier 1, Tier 2, and Tier 3 supports

were necessary, resulting in an adequate response from the student, and next steps within the RTI process. Teams at both the school and district level used implementation data to evaluate the extent to which the assessments, interventions, and supports had been implemented as intended and identify areas of improvement (CMTSS, 2021a). The written policy and outlined process was a first step in establishing a data-driven decision-making process; challenges occurred during implementation.

Challenges associated with the implementation of the RTI framework existed throughout current literature on the topic. On a technical level, the selection of and staff training on evidence-based interventions for each system layer took people, time, and funding investments (Johnson & Smith, 2011). Staff needed to understand the data and use of data aligned to the process, the steps involved in progress monitoring, and expected documentation for making instructional decisions (Johnson & Smith, 2011). Efforts on the technical level supported the activities needed to put the program in place (implementation) but did not account for implementation integrity. Implementation integrity was the degree to which the steps of the process were put into place as intended (Sharp et al., 2015). Fidelity of implementation was another term used to describe alignment to the established process for selecting and delivering interventions (Chapman, 2018). The literature of RTI spoke to the challenges involved in implementing interventions and frustrations of teachers juggling secondary and tertiary supports while also delivering high-quality Tier 1 instruction. Many educators and counselors reported struggles with the complex nature of the framework (August, 2018; Chapman, 2018; Fuchs & Fuchs, 2017; Lopuch, 2018; Sanders & Rutledge, 2019).

Multi-Tiered Systems of Support

Once the processes for data-driven decision-making existed, an implementing district needed to outline the specifics of another critical component of RTI, a multi-level prevention system. The multi-level system of the RTI framework consisted of three levels: primary, secondary, and tertiary prevention. Researchers and resources most often referred to the levels as Tier 1, Tier 2, and Tier 3 (Johnson & Smith, 2011; Lopuch, 2018: Roberts et al., 2013; Sharp et al., 2015; Vaughn et al., 2010).

Tier 1 instruction consisted of a high-quality core curriculum and research-based instructional practices to meet the needs of most students (NCRI, 2014). According to Hughes and Dexter (2011), a high-quality core curriculum was evidence-based instruction to eliminate inadequate student progress resulting from poor instruction. Tier 1 instruction was comprehensive, aligned to grade-level standards, and delivered through instructional strategies and practices with evidence of efficacy (National Center on Intensive Intervention [NCII], 2021). Educators selected research-based instructional strategies aligned to the attributes of the student population and educational context for Tier 1 (CMTSS, 2021b). The consistent use of evidence-based practices and supports was essential for collective efficacy at Tier 1. The Tier 1 program also ensured a positive school climate and conditions for learning (CMTSS, 2021b). According to the Response to Intervention District Plan (2018) in the researched school district, delivering a high-quality core curriculum should meet the needs of approximately 80% of students, as determined by universal screening measurements.

Tier 2 instruction was a set of standardized, targeted interventions to address students' learning or behavioral needs identified (NCRI, 2014). Tier 2 instruction

occurred in addition to Tier 1 instruction. The characteristics of children placed in Tier 2 interventions included those who fell below expected levels on benchmark measurements and were at some risk for poor academic or behavioral outcomes but not at high risk for failure (Shapiro, 2021). In the researched school district, Tier 2 student identification resulted from a universal screening and classroom-level assessment data showing a lack of success in the Tier 1 setting. Students in Tier 2 interventions received support for a minimum of 20 minutes, three times per week in a small group setting. Educators responsible for delivering Tier 2 interventions used district-identified programs aligned to skill deficits detected in screening and assessment data (Researched School District, 2018). According to "Essential Components of RTI – A Closer Look at Response to Intervention," the implementation of an evidence-based secondary level of support needed to address the learning challenges of most at-risk students (NCRI, 2010). In the state of Missouri, local educational agencies determined details for screening, assessments, small group size, and frequency and duration of interventions across levels (MODESE, 2008). The outlined information in the researched school district fell within recommendations in the literature (Fuchs & Fuchs, 2017; Gersten et al., 2017; MODESE, 2008; Sharp et al., 2015)

Tier 3 instruction consisted of individualized, intensive intervention(s) for students with severe and persistent learning or behavioral needs (NCRI, 2014). The goal of Tier 3 instruction was to remediate existing problems and prevent further deficits from developing as a result (Ervin, 2009). Tier 3 instruction occurred in addition to Tier 1 core instruction (NCRI, 2010). Students identified for Tier 3 intervention were at high risk for failure, failed to respond to secondary level support, and became possible candidates for

special education services. Educators monitored the progress and responsiveness of Tier 3 students over time and informed decisions for continued support, removing supports, or referring for special education evaluation (Hughes & Dexter, 2011). Implementing Tier 3 interventions involved a systematic and in-depth analysis of student data (NCII, 2021). As with Tier 2 students, screening, assessment information, and any data gathered during Tier 2 interventions identified the specific student needs. According to the researched school district's Response to Intervention District Plan, a student was considered or moved to a Tier 3 intervention when benchmark scores fell in the lowest 10th percentile compared to peers or evidence of multiple failed Tier 2 interventions existed. A different set of programs supported the delivery of Tier 3 interventions, and the delivery of the intervention increased in frequency, duration, and progress monitoring requirements (Researched School District, 2018). Research advocated for delivering Tier 3 interventions in smaller groups than the Tier 2 setting and individualized one-on-one when possible (NCII, 2021).

Universal Screening

The third essential component identified in the National Center of Response to Intervention (2010) publication was a universal screener. Universal screening involved a systematic process in identifying students at risk for poor learning outcomes in academic, behavioral, social, and emotional development. The National Center on Response to Intervention (2014) described universal screenings as a set of brief assessments administered to all students. The collection of assessments could measure student skills in reading, math, and behavior, depending on the tool. At the time of the study, several vendors offered assessments in all three areas of development (NCII, 2021). Universal

screening typically occurred three times per school year: fall, winter, and spring. The frequency of screenings supported the correct identification of at-risk students, ensuring students received the appropriate level of interventions (Hughes & Dexter, 2011). School districts were to select screening tools reflecting cultural and linguistic responsiveness and recognizing student strengths and needs. Following tool selection, staff training occurred for data collection and data analysis. Educators used data from the universal screening process in data-based decision-making processes. In addition to identifying students who would benefit from supplemental support, screening results supported estimates of the quality of Tier 1 instruction (Nelson et al., 2016).

Progress Monitoring

Progress monitoring, already mentioned, was the fourth component identified by the National Center on Response to Intervention (2010). Progress monitoring was the method educators used to assess student performance, quantify a student's rate of improvement, determine if the instruction and intervention supported growth necessary to meet identified goals, and support efforts around implementation fidelity (CMTSS, 2021a). Students identified as at-risk in the universal screening received frequent monitoring to determine if student learning progressed as needed or if the student needed additional tiers of support. In addition to screening data and progress monitoring, other diagnostic data could be reviewed to support teams in making a well-informed decision (NCII, 2021). Students determined to have less than adequate response or non-responders to Tier 2 instruction progressed to Tier 3 (Hughes & Dexter, 2011). Depending on the program, an inadequate response to multiple interventions resulted in a referral for a special education determination or a change in the intervention program provided to the

individual student. Guidelines for schools in Missouri required evidence of two failed interventions before referring a student for special education evaluation (MODESE, 2008). Progress monitoring tools were brief and easily administered, so student response to the additional instruction was measurable. Progress monitoring required ongoing professional learning focused on ensuring all understood the purpose, had the skills and knowledge to implement the process with fidelity, and used the data to make appropriate decisions regarding student responsiveness to instruction (CMTSS, 2021a)

Implementation Studies for Response to Intervention

Published research on RTI implementation began around 2010. Researchers examined processes for implementation, professional development, teacher perceptions, and student response to tiered supports. Many of the first studies about RTI were conducted at the elementary level, as noted by authors of early middle school studies (Fagella-Luby & Wardell, 2011; Johnson & Smith, 2011; Pyle & Vaughn, 2012). The only study the researcher found connected to the U.S. Department of Education came from 2015. The "Evaluation of Response to Intervention Practices for Elementary School Reading" studied RTI in first to third grade reading across 13 states and 146 schools during the 2011-2012 school year. Results from the study included a determination that only 86% of the schools reported full implementation, and data showed no statistically significant difference between students who received interventions and students who did not receive interventions in second and third grade. For first-grade students, assignment to Tier 2 or Tier 3 interventions resulted in a decrease in reading comprehension measures for students just below the Tier 1 cut-point on a screening test. The study also noted estimated results of reading interventions on reading outcomes varied significantly

across schools (Balu et al., 2015). The published results of the study became a topic for additional publications that both questioned the results and provided different interpretations of the study. Both publications urged educators to examine the RTI practices implemented, including the fidelity of implementation to the process and selected intervention programs, and consider simplifying some components to increase the focus on student learning over process (Fuchs & Fuchs, 2017; Gersten et al., 2017).

Research on RTI implementation at the secondary level was minimal, especially compared to the amount published on RTI at the elementary level. The available secondary studies also showed a focus on the use of RTI for improving students' reading skills (Ciullo et al., 2016; Fagella-Luby & Wardell, 2011; Meyer, 2015; Pyle & Vaughn, 2012; Roberts et al., 2013). The results of the RTI studies in secondary reading had consistent findings. The academic findings showed a statistically significant relationship between students who received secondary or tertiary reading support and student achievement in reading (Ciullo et al., 2012; Dalcourt, 2014; Meyer, 2015; Pyle & Vaughn, 2012; Roberts et al., 2013). One study found students with significant reading struggles who received Tier 3 interventions were unable to close the gap to grade-level reading and maintained the same deficit across one school year. Students in the same setting with significant struggles who did not receive Tier 3 interventions showed a substantial decline in reading performance (Pyle & Vaughn, 2012). Other studies showed evidence that ambitions to close the learning gaps of secondary students within one year of treatment were not realistic and only had small to medium positive results when applying a three-year treatment plan (Roberts et al., 2013; Vaughn et al., 2010). One study also noted student gains were more significant with narrative content, indicating a

need for rigorous instruction in disciplinary reading (Ciullo et al., 2016). The observation supported other commonalities in the literature on RTI at the secondary level. The commonalities included challenges and misplaced assumptions about implementing RTI at the secondary level (Ehren, 2008; Fuchs et al., 2010; Gorski, 2016; Meyer, 2015).

The researcher was only able to find a few studies on math interventions at the secondary level. The studies examined Tier 2 interventions applied at the high school and middle school levels. Across both studies, student learning outcomes showed the differences in growth for students who received a Tier 2 intervention and students who did not receive the Tier 2 intervention were not statistically significant. The researchers noted Tier 2 interventions intended to narrow the achievement gap for students receiving Tier 2 supports, and in both cases, student outcomes failed to show evidence of a narrowed gap (Bouck & Cosby, 2018; Bouck et al., 2019).

The researcher also read current studies on RTI focused on settings within one to three years of implementation. The most prolonged period of implementation located in a review was in Johnson and Smith's (2011) research, “Response to Intervention in Middle School: A Case Study,” which described the work of one district across four years of RTI implementation. Noting the age of study sites was necessary due to the known ambitiousness and complex nature of the RTI framework. The framework's complexity influenced research efforts to evaluate its efficacy (Fuchs & Fuchs, 2017). Sanders and Rutledge (2019) also noted that planning for and implementing RTI was complex and required significant time and effort.

Considerations for Implementation at the Secondary Level

In 2010, Fuchs et al. published a peer commentary on the paper, "Response to Intervention for middle school students with reading difficulties: Effects of a primary and secondary intervention," by Vaughn, et al. (2010). The commentary argued the RTI framework most often used at the elementary level reflected three different assumptions not applicable at the secondary level. The first assumption was the need for screening to identify risk for academic deficits; while the second assumption was the determination of responsiveness to lower-level supports before progressing students to a more intensive level of support. Lastly, Fuchs et al. (2010) questioned the assumption that the attributes of interventions shown to improve student outcomes were the same across all grades. An examination of secondary RTI literature revealed additional information on how the assumptions mentioned in the 2010 commentary influenced implementation at the secondary level.

Multiple studies resulted in calls for the process of screening and identifying secondary students for secondary and tertiary support to consider different factors from elementary screening and identification processes (Ciullo et al., 2016; Fuchs & Fuchs, 2017; Fuchs et al., 2010; Gorski, 2016). Ciullo et al. (2016) stated difficulties finding adequate screening and progress monitoring tools for secondary students. Students at the secondary level were different from elementary students, thus the secondary curriculum had different demands than the elementary curriculum (Pyle & Vaughn, 2010). The culture of the secondary level included an emphasis on testing and evidence of pervasive reading difficulties, which necessitated a conceptually different approach (Ciullo et al., 2016; Pyle & Vaughn, 2012). In addition, a student's reading growth typically plateaued

at the secondary level, which presented a consideration of screening in a content area for better identification of struggling learners (Pyle & Vaughn, 2012). Another screening consideration found in the literature included the admission of nonacademic student data when making decisions about support. In two different publications, researchers urged the analysis of student data to include evidence of student engagement, attendance, referrals, and suspensions. Links between student engagement and low academic performance existed, and educators were amiss if not considering both in selecting secondary students for additional support (Gorski, 2016; Meyer, 2015;).

When considering the criteria for moving a student across support tiers, elementary RTI practitioners waited a minimum of six weeks to determine no response, and plans required two failed interventions before considering a more intensive level of support (MODESE, 2008; Researched School District, 2018). Two six-week periods equated to more than a quarter of the school year. When the literature addressed providing the necessary support to students, there was a sense of urgency implied in statements about middle school being the last opportunity to remediate persistent reading difficulties (Ciullo et al., 2016). Pyle and Vaughn (2012) suggested educators allow an evident gap to widen by waiting to place a student in Tier 3. Fuchs et al. (2010) echoed the argument by noting how academic deficits accumulated and became more severe as students advanced through the grades, making the process more challenging to see students' responsiveness to lower-level supports. Other studies stated possible issues with incorrect implementation or selection of interventions not addressing the problem identified and recommended ways to make the secondary student a partner in understanding and reaching goals built through consensus (Gorski, 2016; Meyer, 2015).

The last recommendation found in the literature for determining responsiveness to interventions was Brief Experimental Analysis (BEA). BEA of academic interventions included testing a student's responsiveness to an intervention before extended implementation. Student performance within and between interventions supported identifying the intervention strategy most likely to yield improvement on the targeted academic skill across multiple sessions (Reisener et al., 2015). As noted throughout the literature, evidence of BEA was more prominent in reading at the elementary level. The work of Reisner (2015) and colleagues started the exploration of BEA at the secondary math level, and the findings were promising.

The final assumption RTI researchers claimed questionable at the secondary level, was selecting an intervention to meet the needs of a secondary learner. As already stated, the curriculum at the secondary level demanded different skills from students than the elementary curriculum, and student reading growth at the secondary level did not progress at the same rate as elementary student growth in reading. Elementary RTI support focused on early intervention, prevention, and identification of learning disabilities. The focus at the secondary level was on remediation, supplemental support, and content recovery (Pyle & Vaughn, 2012). In 2015, research acknowledged interventions at the secondary level needed to support the student's present needs and the student's future needs to assure graduation (Meyer, 2015). A struggling elementary reader might have received interventions on systematic decoding, passage or sentence reading, and literal comprehension; but a struggling secondary reader needed interventions on word study, fluency, vocabulary, and comprehension of grade-level texts (Gersten et al., 2017; Vaughn et al., 2010). Elementary math interventions focused on foundational

skills, such as place value or regrouping instead of grade-level remediation (Dennis et al., 2015). Interventions used for students with severe, accumulated deficits across subcomponent skills and content areas should have been innovative and contextualized to motivate the adolescent learner (Fuchs et al., 2010).

Fuchs et al. (2010) were not the only researchers discussing RTI implementation at the secondary level. The researcher noticed mention of the barriers to implementing RTI presented by the structure of a school day at the secondary level. Multiple studies noted scheduling as a significant challenge when implementing a full RTI model at the secondary level (Bouck & Cosby, 2018; Ciullo et al., 2016; Fuchs & Fuchs, 2017). Schools surveyed reported the first task in preparing for RTI was establishing a time for the core RTI leadership team to meet, followed shortly by considering how identified students received any additional levels of support within the boundaries of the regular school day. Another scheduling challenge was determining a time for teachers to meet and discuss student data and make decisions about starting, ending, or continuing support at the secondary and tertiary tier, in addition to the time needed for teachers to collaborate on instruction and content planning (Prewett et al., 2011). The need for both data discussions and content instructions resulted in two different meeting structures. Teachers who met to discuss content and instructional planning had shared content, but the best practice for discussing and making decisions for tiered support was in multi-disciplinary teams (Gorksi, 2016). Additional challenges addressed in the literature included appropriate staffing for small group sizes required in best practice, resistance among teachers, and limited availability of interventions for secondary level students (Bouck & Cosby, 2018; Prewett et al., 2011). The struggle to implement RTI was not unique to the

middle school level. In 2010, McEwin and Greene listed seven different sources questioning the ability of middle-level schools to implement programs and practices advocated fully in the literature. The next section of reviewed literature focused on the middle school concept and adolescent learners.

The Middle School Concept and Adolescent Learners

In the peer commentary, “Rethinking Response to Intervention at Middle and High School," Fuchs et al. (2010) reasoned researchers avoided studying RTI at the secondary level due to issues with scheduling and the unique development of adolescent learners. The efforts of educators concerning the needs of adolescent learners and the educational model applied dated back to the early 1900s. To better understand the implementation of RTI at the middle school level, information about current middle school practices, middle school students, academic achievement of middle school students, and the literature regarding all were essential to include in the review.

The roots of the current middle school concept began in 1909 when efforts to reorganize secondary education started with the record of the first junior high school in Columbus, Ohio. The introduction of the junior high structure gradually shifted the predominant pattern of school organization from 8-4 to 6-3-3 by 1946 (Lounsbury, 2009). The 6-3-3 pattern distributed grades into kindergarten through sixth grade elementary buildings, seventh to ninth grade junior highs, and tenth to twelfth grade high schools. The new pattern decreased the presence of the 8-4 pattern, which distributed grades into two levels: a kindergarten to eighth grade school and a ninth to twelfth grade secondary school (Lounsbury, 2009). The term "middle school" was not coined until 1963 by William Alexander while delivering a speech at Cornell University. The use of the term

in the speech marked the beginning of the middle school movement, and evidence of a refined definition came from the National Middle School Association's (NMSA) first publication of the position paper, *This We Believe*, in 1982 (Olofson & Knight, 2018). In the original, single-page document, the NMSA defined the essential elements of middle school education, including educators committed to and knowledgeable about students ages 10 through 14, a balanced, developmentally responsive curriculum, diverse instructional strategies, continuous progress for students, evaluation procedures compatible with adolescent needs, and a range of organizational arrangements, such as a complete exploratory program, comprehensive advising and counseling, cooperative planning, and a positive school climate (Alverson et al., 2019; DiCicco et al., 2016; Olofson & Knight, 2018). There have been multiple revisions and publications since 1982, and the fifth edition of *This We Believe* debuted in 2020, under the name *The Successful Middle School: This We Believe*. The Association for Middle Level Education (AMLE, 2021) claimed the 2020 document to be a comprehensive program for districts, schools, and educators to ensure student success with five essential attributes and 18 characteristics of successful schools for the middle grades.

While the support and documentation of middle schools spanned over 60 years, the middle school model had also come under heavy criticism. Critics of the model appeared to place a narrow focus, viewing the purpose of a middle school as preparing students for advanced high school courses, with little to no consideration of the adolescent as a person. However, proponents of the middle school strived to draw a distinction between the idea of a middle school (or building with the middle grades) and the middle school concept. A school could be labeled a middle school, but the grouping

of grades six through eight did not ensure the application of the middle school framework (Lounsbury, 2009). Multiple authors described the middle school framework and cited specific characteristics supported by research to ensure the philosophy of the middle school existed within a building of students in sixth, seventh, and eighth grades (Alverson et al., 2019; Ellerbrock et al., 2018; Lounsbury, 2009; Olofson & Knight, 2018). Each of the publications emphasized support for the model, but noted implementation and consistency varied greatly. Research showed the need for a holistic implementation of the characteristics mentioned above for benefits to be realized (Alverson et al., 2019; Ellerbrock et al., 2018; Lounsbury, 2009; Olofson & Knight, 2018). Some of the contemporary challenges impeding holistic implementation included teacher shortages and the alternative certification programs aimed to alleviate the shortage, and an increased emphasis on standardized assessment (DiCicco et al., 2016).

Student Achievement in Middle Schools

An examination of research on middle schools yielded concerns over a pattern of decreased academic performance of students in the year following a transition to middle school. Historically, many middle school students had not met targeted academic goals and Lounsbury (2009) referenced the label of "the weakest link in American education" (p. 32) when referring to middle schools. When looking at data on academic outcomes, the label made sense. Studies spanning over 20 years mentioned a disproportionate drop in academic achievement for students who transitioned to middle school in grades six or seven, when compared to peers who remained in the same building from kindergarten through eighth grade, postponing the student's first transition until high school and eliminating the need for a second transition (Alspaugh, 1998; Rockoff & Lockwood,

2010; Snipes & Jacobson, 2021; West, 2020). The work of Alspaugh (1998) examined achievement loss of students following the transition from elementary school to middle school and middle school to high school across 16 school districts located in rural areas of Missouri. Students who attended a kindergarten through eighth grade showed the lowest loss in achievement, followed by peers who transitioned from elementary to middle school with the same cohort of students, while students who transitioned from across elementary schools into one middle school showed the greatest losses in academic achievement (Alspaugh, 1998). The 2010 study conducted by Rockoff and Lockwood found middle school student test scores in math and reading were lower than students who attended K-8 schools. The study completed by Snipes and Jacobson (2021) aimed to look at the relationship between student reported levels of growth mindset, academic behavior, and academic outcomes. The findings revealed patterns and relationships not previously addressed in the research, but also concurred with previous studies when examining losses in student achievement between the fifth-grade year in an elementary school and sixth grade in a middle school (Snipes & Jacobson, 2021).

Aware of additional patterns in middle school achievement data, the researcher sought additional literature on how student achievement evolved across the middle school grades. The literature located on middle school achievement focused on the previously discussed dips following the transition from elementary to middle school and subgroup achievement (i.e., students with autism, English as a second language students, students with developmental delays). However, the researcher wanted to provide some data reflecting patterns in student achievement across grades six, seven, and eight. The data

found were state and district student achievement performance on the state's grade-level assessments in 2019. According to MODESE's website:

> The Missouri Assessment Program (MAP) assesses students' progress toward mastery of the Show-Me Standards which are the educational standards in Missouri. The Grade-Level Assessment is a yearly standards-based test that measures specific skills defined for each grade by the state of Missouri. (2022, para. 1)

The authors further stated, "All students in grades 3-8 in Missouri will take the grade-level assessment. English Language Arts (ELA) and Mathematics are administered in all grades" (MODESE, 2021, para. 3), which made the publicly available results fit the researcher's needs. Table 1 outlines grade-level assessment data for the state as a whole and for the researched school district in grades six, seven, and eight for the 2019 assessment administration (MCDS, 2022; Researched School District, 2020). The information provided to the public showed the percentage of students scoring in each of the four levels of proficiency outlined for the assessment. The levels were below basic, basic, proficient, and advanced (MCDS, 2022). According to the results, the trend across grade levels in the percent of student's scoring proficient or advanced on the ELA portion of the grade-level assessment varied between the state level results and district level results. State student data showed the highest percent of students scoring proficient or advanced in eighth grade, followed very closely by sixth grade. The cohort of seventh-grade students in the state of Missouri during the 2018-2019 school year had the least number of students score proficient or advanced when looking at ELA performance at the middle school level. Student ELA results in the researched school district revealed a

decline in the number of students scoring proficient or advanced on the grade level-assessment across grades six, seven, and eight.

Table 1

2019 Missouri Assessment Program Results

		State of Missouri			Researched School District		
		6th Grade	7th Grade	8th Grade	6th Grade	7th Grade	8th Grade
ELA	% Below Basic/Basic	54.1	56.4	52.7	67.2	66	73.4
	% Proficient/ Advanced	45.9	43.6	47.3	32.9	34	26.6
Math	% Below Basic/Basic	57.5	62	70.9	70.6	74.3	93
	% Proficient/ Advanced	42.5	38	29.1	29.4	25.7	7

Note. State of Missouri data was from the *State—content area all and disaggregated 2019* by MCDS, 2022. Researched school district data was from the *[Researched school district] 2019-20 annual report*.

When looking at the grade-level assessment results in math, the researcher found the trend across grade levels at the state level generally mirrored in the results of the students in the researched school district. The percent of seventh-grade students scoring proficient or advanced on the grade-level assessment declined 11% at the state level and 13% at the district level. At the state level, 24% fewer students scored proficient and advanced in eighth grade than in seventh grade. At the researched school district, there was a decrease of 73% in the number of students scoring proficient or advanced in eighth grade when compared to seventh grade results. The dramatic drop from seventh grade to eighth grade in the researched school district was alarming, but additional information

added some context. According to curriculum information available on the district's website, eighth-grade students had an advanced math offering of Algebra I in addition to the regular eighth-grade math course (Researched School District, 2019). A district-wide process for course recommendations guided placement of students at the end of seventh grade for Algebra I or eighth-grade math (Middle School Principal, personal communications, March 15, 2021). Students who take Algebra I do not take the grade-level assessment at the end of the year, but rather take the End of Course Assessment for Algebra I. While many districts offer Algebra I in eighth grade, the practice of students taking the end of course exam instead of the grade-level assessment varies across the state (Middle School Principal, personal communications, March 15, 2021).

The Adolescent Learner

NMSA established the definition of adolescent learners as students between the ages of 10 and 15 (National Middle School Association [NMSA], 2003), whose human body experienced phenomenal growth in intellectual, social, emotional, and physical development during ages 10 and 15, exceeded in volume only by the infancy stage of life (Salyers & McKee, 2010). The unique characteristics of the adolescent served as an anchor for the middle school concept, especially the call for middle school educators to value and be prepared to teach adolescents (Alverson et al., 2019; Jansen & Kiefer, 2020). Amongst the breadth of changes experienced during adolescence, the intellectual changes attracted considerable consideration in the research. Wilson and Horch (2002) discussed neuroscience discoveries connected to a growth spurt in the brain just before puberty preceded by a period of "pruning" (p. 58). Scientists described pruning in the brain as a time when the brain strengthens heavily used connections and less used

connections deteriorate. Evidence suggested the pruning which occurred during adolescent brain growth can “influence learners for the rest of their lives” (Wilson & Horch, 2002, p. 58). The part of the brain that undergoes the most pruning was the prefrontal cortex - the part of the brain responsible for planning, working memory, organization, and mood modulation (Murty et al., 2016; Salyers & McKee, 2010). Amid adolescent intellectual growth, students have shown curiosity and an eagerness to learn about personally relevant topics, preferences for active learning experiences with peers, and less interest in traditional subjects. An increased capacity for abstract thought emerged, supporting an ability to think through ideological topics, argue a position, and challenge adult directives (Brighton, 2007; Flavell & Piaget, 2011; Kellough & Kellough, 2008; Stevenson, 2002). More recent research described the adolescent brain as dynamic, ready to learn, and emphasized the influence of experiences and environment on development (Dahl et al., 2018; Immordino-Yang et al., 2019).

While the intellectual changes of adolescent growth were significant, the changes in moral, social-emotional, and physical growth also received attention in the literature. Caskey and Anafara (2014) defined moral development as "an individual's ability to make principled choices and how to treat one another” (p. 3). According to Scales (2010), the moral development of adolescents included a “move away from blanket acceptance of adult moral judgement to the development of their own personal values, however, they usually embrace the values of key parents or adults” (pp. 62-63). Kellough and Kellough (2008) mentioned a tendency for adolescents to “be idealistic and possess a strong sense of fairness” (p. 54). Other researchers in the field concluded many of the attitudes, beliefs, and values developed during adolescence remained into adulthood (Caskey &

Anafara, 2014; Salyers & McKee, 2010). As students grappled with moral development, changes in social-emotional development took place at a slower rate than other areas of development. The progression of social-emotional development in adolescence included desires of social acceptance by peers, fierce loyalty to a peer group, testing the limits of acceptable behaviors, challenges to adult authority, and feelings of romance or sexual attraction (Caskey & Anafara, 2014; Salyers & McKee, 2010). The concurrent changes in social-emotional and intellectual development tended to lead to difficulty in managing emotions and the literature also noted a connection between a students' social-emotional needs and academic achievement (Jansen & Kiefer, 2020). Lastly, the amount of physical development experienced during adolescence was almost as great as intellectual growth. Significant physical growth occurred in height, weight, internal organs, and skeletal and muscular systems, which increased nutritional demands, led to periods of fatigue and restlessness, and could cause problems with coordination (Caskey & Anafara, 2014; Salyers & McKee, 2010). The unique aspect of physical development over other areas was the unpredictable and varied rate of the changes. According to the Association for Middle Level Education (2021), a six- to eight-year span existed in the physical development of eighth-grade students. The gap stemmed from the fact pubertal stage was more closely associated with individual development than age (Jansen & Kiefer, 2020). The combination of significant variance in time with the dramatic changes across all areas of development revealed the full scope of challenges in educating adolescents.

Educational Practices for the Adolescent Learner

Researchers almost always connected the information about the profound developmental changes in adolescents to implications for educators and educational

practice in the literature. Some authors addressed the different areas of development separately and others linked best practice strategies across the areas. The literature reviewed here spanned two decades, communicated similar messages, and primarily focused on implications for educational practices at the middle school level (Caskey & Anafara, 2014; Jansen & Kiefer, 2020; Robinson, 2017; Salyers & McKee, 2010; Wilson & Horch, 2002). All the recommendations stemmed from the specific changes occurring during the time in a student's life. The prefrontal cortex altered memory, attention, and inhibition; all functions students used in the classroom setting (Wilson & Horch, 2002). The implications on classroom instruction and management spanned from integration of physical activity to explicit metacognitive skills training (Robinson, 2017; Salyers & McKee, 2010). To expand further, Robinson called attention to an essential element of the middle school concept that "has fallen out of practice in recent years" (2017, p. 31). Interdisciplinary teaching was the practice of interweaving concepts from different disciplines in classroom lessons and instruction. Robinson (2017) articulated a continuum of integration options for educators to consider in the following way:

> At a simple level, integration might involve a single teacher explaining a connection between their subject and another, but recommended practices may be much more complex. For example, a team of teachers may choose a theme like globalization, and all of them would then teach about that concept from the perspective of their subject areas. (p. 31)

According to the literature, an integrated approach extended to include real-life concepts, meaningful and authentic activities, and opportunities for students to engage in peer collaboration and cooperative learning (Caskey & Anafara, 2014; Salyers & McKee,

2010; Wilson & Horch, 2002). Researchers also advocated for including service-learning opportunities to bring meaning to uninteresting content and address a community need. Projects of this nature created an emotional response in students, increased engagement, and showed benefits to social-emotional development and social behaviors. (Robinson, 2017; Wilson & Horch, 2002). All the recommended strategies above also provided another key to supporting adolescents. Each allowed for the approach to flex for the wide range of abilities in any given middle-school classroom and could meet the concrete and abstract thinkers (Caskey & Anafara, 2014). The researcher noted while integrated instruction received much attention, recommendations from McEwin and Greene advocated for schools to have an intense focus on core subjects, while continuing to offer a "challenging, exploratory, integrative, and relevant curriculum" (2010, p. 14).

Research on the adolescent brain also claimed the adolescent brain to be highly malleable when planning and during decision-making, which provided opportunities for inclusion of strategies supporting planning, monitoring, and evaluation (Dent & Koenka, 2016; Hodgkinson & Parks, 2016; Jansen & Kiefer, 2020). Strategies mentioned in the literature called for educators to include controversial topics in the classroom to challenge students' previous understanding of content. Classroom experiences were needed to provide students with the opportunity to make choices, explore as interests evolved, and engage in productive discourse (Robinson, 2017). The incorporation of forums to examine rules across the school, home, and society supported connections in the brain between intellectual thinking and moral reasoning (Caskey & Anafara, 2014). One other key recommendation was for students to have regular opportunities for reflective writing and thinking. According to Jansen and Kiefer (2020), written reflections allowed the

learner to reiterate and consolidate learning, reinforcing, and strengthening connections between the prefrontal cortex and other brain areas (p. 22). Robinson (2017) also recommended efforts to teach students how to "eliminate irrelevant information, make inferences and generalizations, and find relationships within the presented information" (p. 34). The development of such skills was likely to enhance the students' abilities to learn content.

Implicit Theories of Intelligence: Mindset

As educators responded to the national call for increased academic outcomes for all students, new approaches to engage, motivate and address the varied needs of learners emerged, and the work on implicit theories of intelligence entered the conversation. Specifically, educators focused on Carol Dweck's idea of fixed versus growth mindset and possible implications on student academic outcomes. The bulk of the literature available on mindset in the educational setting had Dweck's name attached as either the single author or alongside other researchers (Claro et al., 2016; Dweck, 2006, 2007, 2008, 2012; Plaks et al., 2001; Rattan et al., 2012). However, the researcher located multiple studies around mindset in recent years, reflecting the breadth of Dweck's influence in the educational setting. The investigation into recent mindset literature yielded four studies from the last four years connected to the mindset work pursued here (Boyett, 2019; Corradi et al., 2018; Zalaznick, 2018; Zeeb et al., 2020). The researcher initially sought to explore the implications of teacher perceptions of mindset on student learning in the study. Therefore, the final topics reviewed in the literature included mindset, student mindsets, and mindset-related teacher practices.

In 2006, Carol Dweck published the first edition of “Mindset: The New Psychology of Success,” which represented years of research on self-theories and beliefs individuals held about the malleability of intelligence. Since 2006, researchers expanded exploration of implicit theories, amplifying recognition of the importance of how individuals perceived themselves (Dornyei, 2009). Dweck’s (2006) work presented two types of mindsets with distinct characteristics for each. One mindset, known as fixed, was the belief that the abilities and qualities of a person were set in stone and could not be changed. People holding a fixed mindset prioritized performance over learning and often exhibited helplessness when facing a setback (Seaton, 2018). There was also a tendency to follow a particular set of unspoken rules. The first and most important rule to a person with a fixed mindset was "look smart at all costs” (Dweck, 2007, p. 7). Research showed students with a fixed mindset chose to avoid new learning or a situation with the risk of not looking smart and opted to complete a familiar task, with no risk of not looking bright. Additional rules for people with a fixed mindset included: do not make mistakes, do not work hard, and if mistakes happen, do not try to repair them (Dweck, 2007). In 2019, Boyett reported relationships between mindset and anxiety. In the article, Boyett (2019) stated, “individuals with a fixed mindset are more susceptible to anxiety because of the focus they place on performance outcomes and their constant concern with appearing talented” (p. 23).

The other type of mindset Dweck (2006) noticed was a growth mindset or the belief that basic qualities and abilities can grow through effort. People who possess a growth mindset embrace and seek challenges in learning and hold higher levels of intrinsic motivation (Seaton, 2018). In alignment with the belief that abilities developed,

the rules for a person with a growth mindset included: take on challenges, work hard, and confront deficiencies and correct them. The primary rule of the growth mindset is "learn," and in contrast to the fixed mindset person, a growth mindset person puts value on activities that stretched thinking and taught new things (Dweck, 2007). In addition to influencing people's choices, Dweck claimed fixed and growth mindsets changed the meaning of failure and effort. A fixed mindset person shifted failure from an act to an identity (*I failed* versus *I am a failure*), but a growth mindset person took failure as a situation where more effort could improve the outcome (Dweck, 2006).

A person with a fixed mindset believed that one either had an ability or effort was needed, that a person only expended effort when ability was lacking. People with a growth mindset approached effort differently, with admiration. Growth mindset people believed effort awakened ability and yielded accomplishment (Dweck, 2006). A person with a growth mindset attributed a failure to a lack of effort over a lack of ability; mindset was not static. Seaton (2018) found evidence of fluctuations in mindset, influenced by both internal and external ecological systems, based on the activity faced (p. 43). While mindset references often looked at one's self-perception, people could also hold a fixed or growth mindset about others. The result was rapid trait-based judgments from a fixed mindset perspective versus applying situational and psychological processes over trait-based labels (Dweck, 2012).

Student Mindsets in the Educational Setting

While Dweck's (2006) book included some information on mindset and school, chapters addressed mindset in several other contexts, such as parenting, leadership, and love, mentioning famous artists, athletes, and entrepreneurs throughout. The more

significant part of research on mindset in the educational setting was published journal articles and studies. Starting in 2007, researchers, including Dweck, published work discussing the possible implications of mindset work in the educational setting (Claro et al., 2016; Corradi et al., 2018; De Kraker-Pauw et al., 2017; Dweck, 2007, 2008, 2012; Gutshall, 2013; Zeeb et al., 2020). Seaton (2018) claimed implicit theories, combined with other motivational theories, increased understanding of how motivation and resilience could be changed and increased within schools. In addition, the 2009 work of Möller et al. included the statement, "research indicates mastery and helplessness responses to learning are linked to an individual's self-belief" (as cited in Seaton, 2018, p. 42).

Students with a growth mindset showed a significant orientation towards learning goals (Dweck, 2008). The students still valued grades but cared more about the learning and viewed challenges as an opportunity to increase abilities through the power of effort (Claro et al., 2016). Conversely, students with a fixed mindset placed a high value on ability and viewed effort as something only needed when ability lacked within themselves (Dweck, 2008). A student who approached learning with a fixed mindset tended to avoid situations where struggle and the possibility of failure existed because such experiences undermined the sense of intelligence, which the individual valued (Claro et al., 2016). The fixed mindset also appeared to lower a student's motivation to learn (Zeeb, 2019). The response of fixed mindset students upon encountering an obstacle was to employ negative strategies like withdrawal or cheating. Studies showed mindset influenced students' motivation and supported success in social relationships, social-emotional health, conflict resolution, and enhanced willpower. Students with chronic

adolescent aggression displayed a decrease in such behavior following learning experiences on growth mindset Students also showed a significant increase in motivation through challenging academic transitions when an understanding of growth mindset existed (Dweck, 2012).

Researchers who identified the influence of mindset on motivation and approach to learning also showed a connection to academic outcomes (Claro et al., 2016; de Kraker-Pauw et al., 2017; Dweck, 2007; Dweck, 2008; Zalaznick, 2018; Zeeb et al., 2019). Claro et al. (2016) found students with a growth mindset earned better grades, particularly in the face of difficulty, which supported Dweck's 2008 findings that changing students' mindsets could substantially improve grades. A 2007 study followed 400 students over two years during the transition from elementary to junior high. The findings showed students who believed in fixed intelligence struggled with the more stringent grading practices and less personalized learning experience, displaying less resiliency and lower motivation than peers who believed intelligence developed with effort (Dweck, 2007). Another study examined the role of mindset in math and science achievement in adolescent learners. Students completed a survey asking them to agree or disagree with fixed and growth mindsets statements. The survey results classified 40% of students as holding a fixed mindset, 40% of students holding a growth mindset, and 20% had responses inconsistent with either mindset (Dweck, 2008, p. 2).

A comparison of student performance in math and science across two years showed students classified with a fixed mindset performed poorer than peers classified with a growth mindset, and the divergence between the two groups appeared after only one semester (Dweck, 2008). A 2016 study conducted with data from 10th-grade students

across Chile showed a relationship between mindset and higher performance on standardized tests. Students completed a survey with items measuring students' mindsets about the malleability of intelligence, and findings aligned with previous studies on mindset and student achievement (Claro et al., 2016). In addition, the researchers concluded growth mindset efforts were as strong for students from low-income families compared to peers from families with higher incomes. Students categorized with a growth mindset from low-income families performed better than students categorized with a fixed mindset (Claro et al., 2016). However, a 2018 study yielded different conclusions in connecting mindset, academic performance, and ethnicity. Corradi et al. (2018) acknowledged existing data showing students of ethnic minority backgrounds earned fewer credits and lower grades. The researchers then explored possible relationships between growth mindset and academic achievement in students from an ethnic minority background. The study found a growth mindset did "not seem to mediate the negative effects of minority status on academic outcomes" (Corradi et al., 2018, p. 500). When seeking an explanation for the results, the researchers cited the possible influence of cultural differences in understanding the fundamental concepts of a growth mindset presented in the survey, the possibility that specific groups of students may overestimate their academic performances, and variations in the relationship between growth mindset and academic outcomes over time (Corradi et al., 2018).

Teacher Mindsets in the Educational Setting

When reviewing the literature on mindsets in the classroom, the researcher primarily located literature on the relationship, or influence of teacher feedback on student beliefs, efforts, and motivation (Dweck, 2007, 2008; Gutshall, 2013; Zalaznick,

2018, Zeeb et al., 2019). Dweck's work (2007; 2008) found a positive correlation between teacher praise about effort and students' possession of a growth mindset. The first study connecting teacher practice to student mindset showed teachers who praised student effort over intelligence nurtured a growth mindset in students, and teachers praising student intelligence nurtured a fixed mindset. Students in kindergarten and fifth grade responded similarly to each type of praise from teachers (Dweck, 2007). In Dweck's 2008 study on the role of mindset in math and science achievement, teachers received information on either growth mindset or fixed mindset views of intelligence. Researchers observed the teachers provided with information from a growth mindset perspective encouraged and supported students with concrete strategies for improvement (e.g., improvement comes from hard work; suggest additional support from a tutor; present a study strategy). The teachers who received information on a fixed mindset were more likely to comfort struggling students and explain how not everyone is a "math person," (Dweck, 2008, p. 8) The study concluded adults' mindsets and feedback practices could influence students' thoughts on math or science abilities (Dweck, 2008). Gutshall expanded on Dweck's work in 2013, concluding resiliency and persistence in school-aged children grew in response to praise for effort, while praise for ability undermined the two. While Zeeb et al. (2019) integrated research from various other studies. Referencing Boaler (2013), Zeeb et al. stated, "teachers' feedback - influence students' beliefs in a vigorous and permanent manner" (2019, p. 1). While all studies examined concluded praise for effort was preferable when developing a growth mindset in students, Zalaznick added a clarification the researcher found essential to include here. In the article, "How to Project Growth in K-12," Zalaznick (2018) reported on the

mindset practices of teachers in school districts across the United States and noted how one New York superintendent spoke to the struggle of giving feedback which rewards hard effort but provides students with accurate information about where they are concerning the mastery objective (p. 54).

The next most prominent topic found in the literature relating to teacher mindsets was the influence of teacher mindsets on a variety of other factors in the educational setting and recommendations for fostering a growth mindset (Boyett, 2019; Butler, 2001; De Kraker-Pauw, 2017; Dweck, 2008, 2012; Hattie, 2012; Plaks et al., 2001; Seaton; 2018; Swann-Snyder, 1980; Zeeb, 2019). The research noted how adults, specifically teachers, with a growth mindset influenced instructional approaches in areas of support and encouragement to find a solution when faced with a problem, students' thoughts on math abilities, and how a teacher viewed student performance initially and over time (Butler, 2001; Dweck, 2008; Plaks et al., 2001; Swan-Snyder, 1980). Seaton's 2018 study relied on Hattie's visible learning work from 2012, including the proposal "that teacher beliefs have the greatest influence on student achievement and may be able to exert the most influence" (p. 43). One 2017 study noted a positive correlation between teacher mindset and feedback provided and increased student grades (De Kraker-Pauw et al., 2017). In addition to studying connections between teacher mindsets and students, Dweck (2012) found mindset made a difference in other areas, such as success in academics, social, and workplace relationships, and social-emotional health (p. 214). Lastly, one author addressed how both a teacher's mindset and the use of growth mindset practices interact with equity issues. One of the superintendents quoted in Zalaznick's 2018 article in *District Administration* discussed how one who believed in a growth

mindset could not talk about a student's socio-economic disadvantage or country of origin as a barrier to success because belief in a growth mindset included the belief that such obstacles were not impossible to overcome (p. 52). The topic of equity was expanded upon by another school administrator who discussed how the equity component of growth mindset included the need for educators, who were likely to have mostly positive experiences with school, to acknowledge the differences in experiences students bring with them into the classroom, including the internalized negative messages about school and life success some students from underserved communities held (Zalaznick, 2018, p. 55). Efforts to shift student beliefs were present in the recommended practices discussed next.

At the time of the study, Dweck's work on mindset was over 15 years old, and the recent research examined more profound questions of mindset in the educational setting, resulting in a set of core principles for growth mindset pedagogy (Zeeb, 2019) and strategies to foster growth mindset (Boyett, 2019). According to Zeeb (2019), the core principles of a growth mindset pedagogy were support for individual learning processes, promotion of mastery goals instead of comparing performance, continuous communication of high expectations from teachers, and feedback reinforcing profitable strategies and effort displayed by students. The strategies recommended by Boyett (2019) contained some overlap with the principles. Both authors supported using mastery goals and work to praise the students on the process over the person. The additional strategies recommended were for teachers to talk about growth mindset, examine their own response to failure, and equip students with ways to overcome anxiety, including introducing desirable difficulty, also known as productive struggle (Boyett, 2019, pp. 23-

24). Productive struggle was the "effortful practice that goes beyond passive reading, listening, or watching- that builds useful, lasting understanding and skill" (Heibert & Grouws, 2007, p. 378).

Summary

An era of high accountability started with the signing of the No Child Left Behind Act of 2001, which aimed to improve the academic outcomes and offerings for America's elementary and secondary students (U.S. Department of Education [USDE], 2001). The response of educators ranged from implementing multi-tiered systems of support, re-examining practices supported by brain research, and applying strategies focused on mindset in students and teachers. The literature on all three topics provided insight from practitioners and encouraged continued or revised application of the concepts to support students and increase student learning (Alverson et al., 2019; August, 2018; De Kraker-Pauw et al., 2017; Hughes & Dexter, 2011; Seaton, 2018).

Implementation of the RTI model emerged in 2002. The endorsement of RTI in the 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA) resulted in 47 of 50 states recommending the model to local school districts (Hughes & Dexter, 2009; Lopuch, 2018). Since then, researchers conducted studies examining student learning outcomes in systems applying the RTI model. Much of the research focused on implementing the model at the elementary level in reading until around 2011 (Fagella-Luby & Wardell, 2011; Pyle & Vaughn, 2012). The published studies on RTI at the secondary level continued to be less than studies at the elementary level at the time of the review (Fuchs & Fuchs, 2017). However, the few studies on RTI implementation at the secondary level yielded similar findings. Researchers found successful

implementation of practices at the elementary level did not translate equally to the secondary level (Ciullo et al., 2016; Fuchs & Fuchs, 2017; Fuchs et al., 2010; Gorski, 2016). The literature cited various elements of secondary education as the cause, including scheduling difficulties, the demands of the curriculum, needs and development of adolescent learners, and available evidence-based interventions (Bouck & Cosby, 2018; Ciullo et al., Gorski, 2016; 2016; Prewett et al., 201; Pyle & Vaughn, 2012).

Students between the ages of 10 and 15 experienced considerable growth in intellectual, social-emotional, and physical development, second only to the volume of growth in infancy. The unique needs of adolescent learners inspired changes in the structure of schools beginning in 1909 and settling in 1982 with a middle school concept defined by the National Middle School Association (Lounsbury, 2009; Olofson & Knight, 2018). The middle school concept advocated for essential elements, such as educators passionate and knowledgeable about adolescents, a developmentally responsive curriculum, diverse instructional strategies, a complete exploratory program, and comprehensive advising and counseling (Alverson et al., 2019; DiCicco et al., 2016). Research on middle schools identified practices of successful middle schools and discussed implications of the model and the specific needs of the learners. The primary commonality across the literature was a call for interdisciplinary teaching, integrating non-core subjects and real-life concepts into experiences with opportunities for peer collaboration, planning, decision-making, and regular written reflections. The recommendations supported the specific literature on adolescent development and brain research (Caskey & Anafara, 2014; Dent & Koenka, 2016; Hodgkinson & Parks, 2016; Jansen & Kiefer, 2020).

Lastly, implicit theories of intelligence, primarily the work of Carol Dweck on mindsets, found a place in the educational setting. The idea of fixed and growth mindset centered on a belief in the malleability of intelligence. A person with a fixed mindset believed intelligence was set and could not be changed, while a person with a growth mindset believed effort could alter intelligence (Dweck, 2007). The implications of the mindset an individual held were particularly evident in a setting focused on learning. Dweck (2008) claimed students with a fixed mindset were less likely to try something challenging, withdraw when facing a setback, and have less intrinsic motivation than peers holding a growth mindset. In contrast, Dweck (2008) concluded students with a growth mindset showed a mastery orientation, embraced challenges as an opportunity to grow, and were more successful in social relationships and conflict resolution. Multiple studies showed a positive correlation between a growth mindset and academic outcomes (Claro et al., 2016; De Kraker-Pauw et al., 2017; Dweck, 2007b, 2008). While some literature existed on mindsets of teachers and implications on teacher mindset in the classroom, the research focused on the influence of teacher feedback on student mindset (De Kraker-Pauw et al., 2017; Dweck, 2007b, 2008; Gutshall, 2013; Seaton, 2018). A few studies saw an influence of teacher mindset on instructional approach, teacher self-efficacy, and how teachers viewed the initial performance of students and performance over time (Butler, 2000; Plaks et al., 2001; Rattan et al., 2012; Swann & Snyder, 1980). The researcher found the literature to be lacking and in need of additional contributions when considering the role of the teacher's perceptions of mindset in student outcomes.

Chapter Three provided information on the research and design of the study. The researcher provided study context, research procedures with a description of the tools used for data, and data analysis information.

Chapter Three: Research Method and Design

Research Study Context

The research study site was a school district in an urban area of Missouri with a diverse population and enrollment of approximately 6,300 students. According to the 2019-2020 researched school district's annual report, the student demographics were: 41% African American, 0.2% American Indian/Alaska Native, 1.6% Asian, 22.8% Hispanic, 8.5% Multi-Racial, 25.8% White, and 0.1% Native Hawaiian/Pacific Islander (Researched School District, 2020, p. 3). The Missouri Comprehensive Data System reported the free and reduced lunch population percentage at 100%, almost 56% greater than the reported percent of the state population eligible for free and reduced lunch; attendance rates of 77.2%, and a mobility rate of 20.56% for the 2019-2020 school year. The reported graduation rate was 76.54%, compared to the 89.62% reported at the state level, and the researched school district's dropout rate was over three times as high as the state level at 4.6% for the 2019-2020 school year (MCDS, 2021, para 1).

For the study, the researcher used data from sixth, seventh, and eighth-grade students and teachers in the district, to look at possible differences and relationships among measured characteristics. The researcher examined student academic growth in English Language Arts (ELA) and Math for possible differences in students who did and did not receive additional academic support through Tier 3 instruction and possible relationships between student academic growth and teacher perceptions of mindset. The researched school district had one early childhood school, six elementary schools (kindergarten through fifth grades), two middle schools housing grades six, seven, and eight, and one high school for ninth through twelfth-grade students.

According to the public 2019 MSIP5 District/Charter APR Supporting Data Report, student academic achievement in English Language Arts (ELA) and Math had declined over the past few years (MCDS, 2019). The district's Response to Intervention (RTI) plan indicated one of the purposes of RTI for the district was to respond to the data indicating large numbers of students not at proficiency levels in reading and math (Researched School District, 2020). The document also outlined the district expectations regarding instruction provided across all levels of support; including details about instruction provided to all students (Tier 1 instruction), students who struggled with reading, math, or behavior (Tier 2 instruction), and students who struggled significantly with reading, math, or behavior (Tier 3 instruction). The RTI plan indicated Tier 1 instructional time at the middle school level was a 90-minute reading/writing block for ELA and 50 to 60 minutes for math. According to the RTI plan, Tier 2 and Tier 3 instruction for reading and math took place in addition to the instruction provided to all students, and occurred in a small, flexible group or individual setting. Tier 2 instruction took place in the general classroom and Tier 3 instruction took place in an alternative setting. A team of educators followed a standardized process and established the time and days based on student needs (Researched School District, 2020). Conversations in August of 2019 with the middle school principals revealed Tier 3 instruction was delivered to middle school students in reading or math during a 45-minute block daily. Only students identified as needing Tier 3 support received the additional time for instruction in one of the content areas. If a student showed a need in both reading and ELA, a team of educators chose one content area for Tier 3 support and relied on Tier 1 and Tier 2 supports for the other content area.

Given the district data, the researcher wanted to investigate possible relationships between student academic growth and factors in the school setting. One relationship explored was a possible difference between the academic growth of students who received Tier 3 instruction at the middle school level and a statistically like group of students who did not receive Tier 3 instruction, as measured by district-wide assessments. The second possible relationship explored was the possibility of a relationship between teacher perceptions of mindset, including classroom practices, and the academic growth of middle school students in ELA and math. In Chapter Three, the researcher outlined details of the hypotheses, research procedure, data collection, and analysis procedures implemented in the study.

Null Hypotheses

Null Hypothesis 1: There was no difference in the academic growth of students who received Tier 3 instruction in reading and a statistically like group of students who did not receive Tier 3 instruction in reading.

Null Hypothesis 2: There was no difference in the academic growth of students who received Tier 3 instruction in math and a statistically like group of students who did not receive Tier 3 instruction in math.

Null Hypothesis 3: There was no relationship between the English Language Arts academic growth of sixth-grade students and the perceptions of mindset of English Language Arts teachers.

Null Hypothesis 4: There was no relationship between the Math academic growth of sixth-grade students and the perceptions of mindset of Math teachers.

Null Hypothesis 5: There was no relationship in the English Language Arts academic growth of seventh-grade students and the perceptions of mindset of English Language Arts teachers.

Null Hypothesis 6: There was no relationship in the Math academic growth of seventh-grade students and the perceptions of mindset of Math teachers.

Null Hypothesis 7: There was no relationship in the English Language Arts academic growth of eighth-grade students and the perceptions of mindset of English Language Arts teachers.

Null Hypothesis 8: There was no relationship in the Math academic growth of eighth-grade students and the perceptions of mindset of Math teachers.

Research Procedures

The data collected for the quantitative study consisted of secondary data from district-wide assessments and a teacher survey. For each of the types of data, the researcher used a different approach for obtaining a sample population. The decisions were made based on known information about the research site and the availability of data.

Purposive sampling occurred when a researcher used personal judgment to select a sample (Fraenkel et al., 2019). The purposive method of sampling guided the first step in selecting the sample for the secondary data. Student attendance and enrollment were factors for participant selection. Previous studies found attendance influenced student academic performance (Gottfried, 2010). The specific purpose of the study examined a possible relationship between student academic growth and Tier 3 instructional support in reading or math and a possible relationship between student academic growth and teacher

perceptions of mindset and classroom practices. The researcher did not want to examine the relationship between academic growth and student attendance. For this reason, the first criterion for selection was enrollment in the district for the duration of the academic school year and an attendance rate of 90% or above. The researcher selected the participant criterion based on the Missouri Department of Elementary and Secondary Education expectation for school districts to sustain an attendance rate of 90% of students with an attendance rate of 90% or above (Missouri Department of Elementary and Secondary Education [MODESE], 2018a). The researcher used permissions granted by the district and generated a list of middle school students meeting the attendance criteria in late April of the 2019-2020 academic year. Using the list, the researcher selected sample population groups appropriate for Null Hypotheses 1 through 4. The student sample populations for students who received Tier 3 instruction in reading and math and the students who did not receive Tier 3 instruction in reading and math were reflective of the racial demographics of the population of middle school students receiving Tier 3 instruction. The student sample populations for students in sixth-, seventh-, and eighth-grade ELA and Math were reflective of the racial demographics of the students in the district's annual report (Table 2).

Table 2

2019-2020 Racial Demographics in Researched School District

Group	African American	Asian	Hispanic	Native American	Multi-racial	White
Tier 3 ELA Students	67.3%	0%	15.4%	0%	0%	17.3%
Tier 3 Math Students	48.7%	0%	17.1%	1.3%	9.2%	23.7%
Student Population	41%	1.6%	22.8%	0.2%	8.7%	25.9%

Participant recruitment for survey participation started with identifying middle school teachers of ELA and Math. The researcher worked with the principal of each middle school to obtain a list of teachers and email addresses for teachers who taught either ELA or Math in grades six, seven, and eight. Teachers who met the criteria received an email invitation to participate in the study by completing the survey (See Appendix C). The invitation clearly stated participation was voluntary and anonymous. The researcher resent the invitation to complete the survey to the same group of teachers four and six weeks after the initial invitation. to gather more responses.

District Administered Assessments

The secondary data used for the study came from assessments administered multiple times a year to all middle school students as a part of the district's assessment plan. The assessments included FastBridge Adaptive Reading (aReading), FastBridge Curriculum-Based Measurement for Reading (CBM-Reading), and the Evaluate

Benchmark assessment for ELA. The aReading assessment was a computer-administered, adaptive measure of broad reading to assess a variety of skills, including concepts of print, phonemic awareness, phonics, comprehension, and vocabulary. The CBM-Reading was an evidence-based, one-minute assessment used for universal screening to help identify students at-risk for academic failure (Illuminate Education, 2021b). For Math, the researcher used FastBridge Adaptive Math (aMath), FastBridge Curriculum-Based Measurement for Math Process (CBM-Math Process), and the Math Evaluate Benchmark assessment. The aMath assessment was a fully automated computer-adaptive measure of broad math skills, including counting and cardinality, operations and algebraic thinking, number and operations in base 10, numbers and operations, measurement and data, and geometry. CBM-Math Process was a group-administered assessment to assist teachers in understanding students' strengths and areas of difficulty when computing math problems (Illuminate Education, 2021a). The Evaluate Benchmark assessments provided immediate results of student progress towards the end of the year standards in ELA and Math.

Students completed each of the assessments multiple times a year. Table 3 outlined the timing details of administration for each assessment and the data report used by the researcher for the study. The researcher used permissions granted by the district to generate reports for each grade level and content area. The researcher removed identifying information after selecting the stratified random sample of 50 students for each group.

Table 3

Secondary Data Administration and Report Information

Assessment Name	Timing and Frequency of Administration	Report Information
FastBridge aReading	Fall, Winter, Spring	FastBridge aReading Screening Report
FastBridge CBM-Reading	Fall, Winter, Spring	FastBridge CBM-Reading Screening Report
ELA Evaluate	Monthly from September through April	Evaluate Student Progress Report following the March test
FastBridge aMath	Fall, Winter, Spring	FastBridge aMath Screening Report
FastBridge CBM-Math Process	Fall, Winter, Spring	FastBridge CBM-Math Process Screening Report
Math Evaluate	Monthly from September through April	Evaluate Student Progress Report following the March test

Survey

In 2016, the Education Week Research Center administered a national survey to K-12 educators on the topic of mindsets in the classroom. The original survey measured teacher responses on the topics of perspectives, professional development, and classroom practices connected to mindset. As a first step in the process, the researcher received permission to modify and use the 2016 survey (see Appendix A). The modified survey questions were entered into the *Qualtrics* online platform and distributed to potential participants using email addresses provided by the middle school building principals. The

use of the *Qualtrics* platform ensured secure data collection and protected the anonymity of the participants.

The survey used in the study contained a total of 11 questions for participants to complete. The first two questions asked participants to identify the grade level and content area taught at the middle school level. The remaining questions gathered teacher perceptions on a variety of topics involving students, mindset, and classroom practices. Each question had an anchor statement followed by a list of statements for participants to record a response on a Likert scale. The survey included four questions to gather teacher perceptions of student beliefs, characteristics, behaviors, and success factors, three questions sought teacher perceptions of growth mindset and others in the school environment, perceptions on how certain statements encourage or discourage students to learn with a growth mindset, and results from using growth mindset in their own teaching. Lastly, the survey included two questions that requested teachers to self-report the degree to which teachers use and integrate growth and fixed mindset practices into classroom expectations and practices.

The researcher sent an invitation to complete the survey to 26 math teachers and 25 ELA teachers across two middle school buildings. The preferred participation rate was a minimum of 50% of the potential participants for each content area group, ELA, and Math. To reach 50% participation, the researcher needed a minimum of 13 completed surveys from each of the two content area groups.

Data Analysis

Following the district's spring assessment window, the researcher used purposive and stratified random sampling, as previously described, to identify the individual

students in each sample group. The next step was locating the student data in each of the FastBridge screening reports for each member in the sample groups. The following paragraphs outline the steps taken to analyze the data for the proposed hypotheses.

For Null Hypothesis 1, the researcher entered growth information for each student from each assessment report used. The FastBridge Screening report provided a "District Growth Percentile" for each student in the aReading and CBM-Reading assessment. The researcher extracted the result for each student in the sample group into an Excel spreadsheet. For the ELA Evaluate Student Progress Report, the researcher calculated the difference between each sample group student's March percent-correct score and the student's September percent-correct score and recorded the resulting value into the Excel spreadsheet holding the data from the FastBridge reports. The researcher removed the identifiable data and replaced it with non-identified labels. Each label listed the level of instruction a student received, a letter for the content area, and an assigned number, 1 through 50 (see Table 4). After applying a *z*- test for difference in means with resulting values, the researcher compared the mean growth in the aReading, CBM-Reading, and ELA Evaluate assessments for students who received Tier 3 reading instruction to the mean growth in the aReading, CBM-Reading, and ELA Evaluate for students who did not receive Tier 3 reading instruction. The researcher looked for a statistically significant difference in the means of each group across two of the three assessments to reject Null Hypothesis 1.

For Null Hypothesis 2, the researcher followed the same process applied to the data connected to Null Hypothesis 1. The researcher entered growth information for each student from each assessment report used. The FastBridge Screening report provided a

"District Growth Percentile" for each student in the aMath and CBM-Math Process assessment. The researcher extracted the result for each student in the sample group into an Excel spreadsheet. For the Math Evaluate Student Progress Report, the researcher calculated the difference between each sample group student's March percent-correct score and the student's September percent-correct score and recorded the resulting value in the Excel spreadsheet holding the data from the FastBridge reports. Non-identifying labels replaced student names. Each label listed the level of instruction the student received, a letter for the content area, and an assigned number, 1 through 50 (see Table 4). After applying a *z*- test for mean with resulting values, the researcher compared the mean growth in the aMath, CBM-Math Process, and Math Evaluate for students who received Tier 3 math instruction to the mean growth in the aMath, CBM-Math Process, and Math Evaluate for students who did not receive Tier 3 math instruction. The researcher sought a statistically significant difference in the means of each group across two of the three assessments to reject the Null Hypothesis 2.

Table 4

Non-Identifying Student Labels for Null Hypothesis 1-2

Null Hypotheses	Label for Tier 3 Students	Label for Non-Tier 3 Students
Null Hypothesis 1	T3R1- T3R50 for Tier 3 reading Students	T1R1- T1R50 for non-Tier 3 reading Students
Null Hypothesis 2	T3M1- T3M50 for Tier 3 math Students	T1M1- T1M50: for non-Tier 3 math Students

In the initial study design, the researcher planned to apply a Pearson-Product Moment Correlation Coefficient with student academic growth data and results from the

mindset survey administered to middle school math and ELA teachers. The researcher wanted to use the information to determine if the perceptions held by teachers had a relationship to student academic growth, including a possible difference in the relationship between the two factors in math teachers, as compared to ELA teachers. Following data collection in the spring of 2020, the researcher concluded low participation in the teacher survey led to a lack of sufficient data to address the hypotheses as planned. The goal was to have a minimum of 13 completed surveys for each content area. Data collected from middle school ELA teachers exceeded the goal with a total of 16 completed surveys, but data collected from middle school math teachers fell short with a total of only six completed surveys. A reevaluation of the ability to use the available data produced the following revised Null Hypotheses.

Null Hypothesis 3: There was no difference in the academic growth of 6th-grade, 7th-grade, and 8th-grade English Language Arts students.

Null Hypothesis 4: There was no difference in the academic growth of 6th-grade, 7th-grade, and 8th-grade math students.

Null Hypothesis 5: There was no difference in average ratings for each category in a mindset survey across groups of teachers who taught 6th grade ELA, 7th grade ELA, 8th grade ELA, 6th-grade math, 7th-grade math, and 8th-grade math

Null Hypothesis 6: There was no difference in the collective average ratings (teacher responses) to survey sub-questions when considering grade level and subject matter taught.

Null Hypothesis 7: There were no differences between the average ratings (teacher responses) of individual sub-questions without regard to categories, grade level, or subject matter taught.

The data for Null Hypothesis 3 and Null Hypothesis 4 required a process like the one used with Null Hypotheses 1 and 2. For Null Hypothesis 3, the researcher used the list of students meeting the 90% attendance rate criteria to select a stratified random sample of 50 students for sixth grade ELA, seventh grade ELA, and eighth grade ELA. The racial demographics of the sample population matched the racial demographics of the researched school district (see Table 2). The researcher used the FastBridge Screening report for the aReading and CBM-Reading assessment to locate growth information for each student in the ELA sample groups. The "District Growth Percentile" for each student in the sample population groups went into an Excel spreadsheet where the researcher removed all identifying information and replaced it with nonidentifying labels. Each label listed the student's grade level, content area, and an assigned number, 1 through 50 (see Table 5).

Table 5

Non-Identifying Student Labels for Null Hypothesis 3-4

Group	6th Grade	7th Grade	8th Grade
ELA Sample Populations	G6R1-G6R50	G7R1-G7R50	G8R1-G8R50
Math Sample Populations	G6M1-G6M50	G7M1-G7M50	G8M1-G8M50

The researcher found the mean growth percentage for the aReading and CBM-Reading assessment for sixth grade ELA, seventh grade ELA, and eighth grade ELA student sample population groups. To compare academic growth between grade levels, the researcher applied a *z*-test for difference in proportions with each pair of grade levels with each assessment (see Table 6). The resulting *z*-value was compared to the *z*-critical value on 1.95 to determine whether to reject or not reject the Null Hypothesis.

Table 6

List of z- tests performed for Null Hypothesis 3-4

Assessment	Sample Population Means for *z*-test of Proportion		
aReading	6th Grade and 7th Grade	6th Grade and 8th Grade	7th Grade and 8th grade
CBM-Reading	6th Grade and 7th Grade	6th Grade and 8th Grade	7th Grade and 8th grade
aMath	6th Grade and 7th Grade	6th Grade and 8th Grade	7th Grade and 8th grade
CBM-Math Process	6th Grade and 7th Grade	6th Grade and 8th Grade	7th Grade and 8th grade

For Null Hypothesis 3, the researcher used the list of students meeting the 90% attendance rate criteria to select a stratified random sample of 50 students for sixth-grade math, seventh-grade math, and eighth-grade math. The racial demographics of the sample population matched the racial demographics of the researched school district (see Table 2). The researcher used the FastBridge Screening report for the aMath and CBM-Math Process assessment to locate growth information for each student in the math sample groups. The “District Growth Percentile” for each student in the sample population groups went into an Excel spreadsheet where the researcher removed all identifying

information replacing with nonidentifying labels. Each label listed the student's grade level, content area, and an assigned number, 1 through 50 (see Table 5). The researcher found the mean growth percentage for the aMath and CBM-Math Process assessment sixth-grade math, seventh-grade math, and eighth-grade math student sample population groups. To compare academic growth between grade levels, the researcher applied a *z*-test for difference in proportions with each pair of grade levels with each assessment (see Table 6). The resulting *z*-value was compared to the *z*-critical value on 1.95 to determine whether to reject or not reject the Null Hypothesis.

For Null Hypotheses 5 through 7, the researcher used data from the completed teacher surveys. The researcher extracted data from *Qualtrics* which showed completed surveys with teacher responses to sub-question within the mindset survey. Each completed survey received a label indicating the grade level and content of the responding teacher along with a number (see Table 7). The researcher grouped the survey responses by grade level and content area to find average ratings by group for each category of questions and each sub-question. The survey included nine categories of questions and each category had varying numbers of sub-questions. For Null Hypothesis 5, the researcher took the average rating for each category by each group and applied an ANOVA. The resulting *F*-value was compared to the resulting *F*- critical value to determine whether to reject or not reject Null Hypothesis 5.

Table 7

Non-Identifying Labels for Staff Survey Responses

Group	6th Grade	7th Grade	8th Grade
ELA Teachers	6ELA1-6ELA13	7ELA1-7ELA13	8ELA1-8ELA13
Math Teachers	6Math1-6Math13	7Math1-7Math13	8Math1-8Math13

For Null Hypothesis 6, the researcher applied an ANOVA to the average ratings of the individual sub-questions for each of the six groups of teachers. The resulting *F*-value was compared to the resulting *F*-critical value to determine whether to reject or not reject Null Hypothesis 6. The researcher applied an ANOVA for Null Hypothesis 7 as well, using the average ratings of individual sub-questions with no regard given for grade level or content. The resulting *F*-value was compared to the resulting *F*-critical value to determine whether to reject or not Null Hypothesis 7.

Summary

The aim of the study was to extend current research on the topic of RTI at the secondary level and the possible relationship between student growth and teacher perception of mindset practices in the classroom. The measures selected to indicate student growth provided multiple measures of student performance over time from assessments with numerous purposes: skill-based and standards-based. Collectively, the assessments allowed the researcher to compare the growth of students in the two different settings. The addition of the teacher survey expanded on existing information on teacher perspectives in the research. Chapters Four and Five contained the data for each hypothesis and provided analysis and discussion of the results. The discussion included

recommendations for building and district leaders on RTI practices at the middle school level and the current beliefs of staff on the topic of mindsets in the ELA and math classroom.

Chapter Four: Results and Analysis

Introduction

In Chapter Four the author detailed the researcher's analysis of quantitative data addressing the hypotheses for the study. For the first two hypotheses, the researcher looked at possible differences in academic growth between statistically-like groups of middle school students who did and did not receive Tier 3 instruction in reading or math, using secondary data from district-wide assessments administered in the researched school district. The remaining hypotheses explored possible differences in academic growth across grade levels and content areas at the middle school level, using the same set of secondary student data and possible differences in the perceptions of mindset held by math and ELA teachers in sixth, seventh, and eighth grade based on survey data gathered from teachers in the researched district.

Results

Null Hypothesis 1: There is no difference in the academic growth of students who received Tier 3 instruction in reading and a statistically like group of students who did not receive Tier 3 instruction in reading.

Using the data collected for the students in each reading sample population, the researcher conducted a *t*-test of two means to determine if the academic growth of students who received Tier 3 support in reading differed from the academic growth of students who did not receive Tier 3 support in reading. A preliminary test of variances revealed the variances were not equal. The researcher used a *t*-test of two independent means with unequal variances to determine if a statistically significant difference in means existed. The analysis of the reading Evaluate results (see Table 8) revealed no

statistically significant difference in the academic growth of students who received Tier 3 reading instruction and the academic growth of students who did not receive Tier 3 reading instruction. The analysis of the aReading (see Table 8) results revealed no statistically significant difference in the academic growth of students who received Tier 3 reading instruction and the academic growth of students who did not receive Tier 3 reading instruction. Lastly, the analysis of the CBM-Reading (see Table 8) results revealed no statistically significant difference in the academic growth of students who received Tier 3 reading instruction and the academic growth of students who did not receive Tier 3 reading instruction. The results of the *t*-tests did not yield a statistically significant difference in means on any of the three assessment measures used for the study (Evaluate, aReading, and CBM-Reading). Therefore, the researcher did not reject the null hypothesis and concluded there was not enough evidence to support the claim there was a difference in the academic growth of students who received Tier 3 reading support and students who did not receive Tier 3 reading support.

Table 8

Results for Null Hypothesis 1

Group	Tier 3 Reading Students		Non-Tier 3 Reading Students				
	M	SD	M	SD	df	t	p
Evaluate	2.5	12.184	6.6	13.653	49	-1.58	0.116
aReading	57.12	35.812	54.36	30.7	49	0.41	0.68
CBM-Reading	41.02	25.728	36.48	26.745	49	.87	0.389

Null Hypothesis 2: There is no difference in the academic growth of students who received Tier 3 instruction in math and a statistically like group of students who did not receive Tier 3 instruction in math.

Using the data collected for the students in each reading sample population, the researcher conducted a *t*-test of two means to determine if the academic growth of students who received Tier 3 support in math differed from the academic growth of students who did not receive Tier 3 support in math. A preliminary test of variances revealed the variances were not equal. The researcher used a *t*-test of two independent means with unequal variances to determine if a statistically significant difference in means existed. The analysis of the math Evaluate results (see Table 9) revealed a statistically significant difference in the academic growth of students who received Tier 3 math instruction and the academic growth of students who did not receive Tier 3 math instruction. The analysis of the aMath (see Table 9) results revealed no statistically significant difference in the academic growth of students who received Tier 3 math instruction and the academic growth of students who did not receive Tier 3 math instruction. Lastly, the analysis of the CBM-Math Process (see Table 9) results revealed no statistically significant difference in the academic growth of students who received Tier 3 math instruction and the academic growth of students who did not receive Tier 3 math instruction. The results of the *t*-tests did not yield a statistically significant difference in means in two of the three assessment measures used for the study (Evaluate, aMath, and CBM-Math Process). Therefore, the researcher failed to reject the null hypothesis and concluded there was not enough evidence to support the claim that there

was a difference in the academic growth of students who received Tier 3 reading support and students who did not receive Tier 3 reading support.

Table 9

Results for Null Hypothesis 2

Group	Tier 3 Math Students		Non-Tier 3 Math Students				
	M	SD	M	SD	df	t	p
Evaluate	9.6	14.668	16.26	16.652	49	-2.12	0.036
aMath	49.442	32.77	48.219	29.266	49	0.20	0.844
CBM-Math Process	33.92	26.698	29.42	25.855	49	0.86	0.394

Null Hypothesis 3: There was no difference in the academic growth of 6th-grade, 7th-grade, and 8th-grade English Language Arts students.

To compare achievement between grade levels, the researcher applied a *z*-test for difference in proportion using the mean growth on the aReading and CBM-Reading for each grade level (see Table 10). The results of the *z*-test value for sixth grade aReading compared to seventh grade aReading was $z = 0.074$. The results of the *z*-test value for sixth grade aReading compared to eighth grade aReading was $z = 0.338$ and the results of the *z*-test value for seventh grade aReading compared to eighth grade aReading was $z = 0.412$. When compared to the *z*-critical value of 1.95, the researcher concluded there were no significant differences in academic growth between any two grade levels on the aReading assessment.

The results of the *z*-test value for sixth grade CBM-Reading compared to seventh grade CBM-Reading was $z = 1.086$. The results of the *z*-test value for sixth grade CBM-Reading compared to eighth grade CBM-Reading was $z = 0.956$, and the results of the *z*-test value for seventh grade CBM-Reading compared to eighth grade CBM-Reading was $z = 2.031$. When compared to the *z*-critical value of 1.95, the researcher concluded there were no significant differences in academic growth between sixth and seventh-grade students or sixth and eighth-grade students, but there was a significant difference in comparing the growth of seventh and eighth-grade students on the CBM-Reading assessment. There was only one comparison of academic growth between grade levels, which differed across the two assessments. For this reason, the researcher failed to reject the null hypothesis and concluded there was not enough evidence to support the claim that there was a difference in academic growth when comparing any two middle school grades.

Table 10

Results for Null Hypothesis 3

Group	6th Grade ELA		7th Grade ELA		8th Grade ELA	
	M	SD	M	SD	M	SD
aReading	49.48	26.246	50.22	29.729	46.10	32.214
CBM Reading	47.40	29.425	58.2397	30.337	37.94	28.806

Null Hypothesis 4: There was no difference in the academic growth of 6th-grade, 7th-grade, and 8th-grade grade math students.

Following the process from Null Hypothesis 4, the researcher repeated using a *z*-test for difference in proportion using the mean growth on the aMath and CBM-Math Process assessments for each grade level (see Table 11). The *z*-test value for sixth grade aMath compared to seventh grade aMath was $z = 0.087$. The *z*-test value for sixth grade aMath compared to eighth grade aMath was $z = 0.385$ and the results of the *z*-test value for seventh grade aMath compared to eighth grade aMath was $z = 0.472$. When compared to the *z*-critical value of 1.95, the researcher concluded there were no significant differences in academic growth between sixth and seventh-grade students, sixth and eighth-grade students, or seventh and eighth-grade students on the aMath assessment. The *z*-test value for sixth grade CBM-Math Process compared to seventh grade CBM-Math Process was $z = .0206$. The results of the *z*-test value for sixth grade CBM-Math Process compared to eighth grade CBM-Math Process was $z = 0.903$ and the results of the *z*-test value for seventh grade CBM-Math Process compared to eighth grade CBM-Math Process was $z = 1.108$. When compared to the *z*-critical value of 1.95, the researcher concluded there were no significant differences in academic growth between sixth and seventh-grade students, sixth and eighth-grade students, or seventh and eighth-grade students CBM-Math Process assessment. Collectively, there were no comparisons between grade levels across two assessments. For this reason, the researcher failed to reject the null hypothesis and concluded there was not enough evidence to support the claim there was a difference in academic growth when comparing any two middle school grades.

Table 11

Results for Null Hypothesis 4

Group	6th Grade Math		7th Grade Math		8th Grade Math	
	M	SD	M	SD	M	SD
aMath	46.90	29.874	46.03	29.705	50.75	28.009
CBM-Math Process	53.72	30.846	51.66	29.231	62.63	30.536

Null Hypothesis 5: There was no difference in average ratings for each category in a mindset survey across groups of teachers who taught 6th grade ELA, 7th grade ELA, 8th grade ELA, 6th-grade math, 7th-grade math, and 8th-grade math.

To test Null Hypothesis 5, the researcher first calculated the average rating for each of the nine categories (Q3-Q11) featured in the survey for each group of teachers represented in the collected survey results (see Table 12). Six groups of teachers had average ratings for each category in the survey. The groups included sixth grade ELA, seventh grade ELA, eighth grade ELA, sixth-grade math, seventh-grade math, and eighth-grade math. The researcher noticed one category containing three questions received the highest possible rating of 4.0 from three of the six teacher groups surveyed. All teachers in the seventh grade ELA, sixth grade Math, and eighth grade Math groups selected the descriptor “strongly agree” for all three sub-questions for question 11. Within the category, sub-questions Q11_1 and Q11_2 received a 4.00 rating from every teacher who completed the survey. Question 11 on the survey elicited teachers’ perspectives on the results produced by integrating a growth mindset into teaching. Every survey participant believed integrating a growth mindset into teaching would improve

student learning and improve teacher instruction and classroom practice. The variation in the sixth grade ELA, eighth grade ELA, and seventh-grade math groups was in response to the last sub-question. Q11_3 related to the teacher's perspective on how significantly the integration of growth mindset practices changed classroom instruction. While all teachers agreed with the statement, some teachers in responses from sixth grade ELA, eighth grade ELA, and seventh-grade math teachers did not strongly agree.

Table 12

Average Response Ratings by Category for Teacher Groups

Grade Level	Content	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
6th Grade	ELA	3.25	3.17	2.34	3.17	3.17	3.25	2.58	2.67	3.67
7th Grade	ELA	3.17	3.25	2.50	3.27	3.25	3.09	2.67	3.00	4.00
8th Grade	ELA	3.25	3.38	2.63	3.00	3.00	3.25	2.63	2.75	3.75
6th Grade	Math	3.50	3.50	2.50	2.50	2.75	2.50	2.50	2.50	4.00
7th Grade	Math	3.50	3.25	2.50	3.25	2.50	3.25	3.00	2.00	3.50
8th Grade	Math	2.50	3.50	2.50	2.50	3.50	3.50	2.75	3.50	4.00

To draw a conclusion on Null Hypothesis 5, the researcher used the average ratings (see Table 12) for the individual categories represented in the survey and applied an ANOVA. The averages and variances used and resulting values were listed in Table 13. The results showed an *F*-value greater than the *F*-critical value. For this reason, the researcher rejected the Null Hypothesis. There was enough evidence to support the claim of differences in the average ratings for categories in a mindset survey across groups of teachers who taught sixth grade ELA, seventh grade ELA, eighth grade ELA, sixth-grade math, seventh-grade math, and eighth-grade math.

Table 13

ANOVA Results for Null Hypothesis 5

ANOVA: Single Factor

SUMMARY

Groups	Average	Variance
Q3	3.1950	0.1351
Q4	3.3416	0.0195
Q5	2.4950	0.0084
Q6	2.9483	0.1296
Q7	3.0283	0.1298
Q8	3.1400	0.1156
Q9	2.6883	0.0303
Q10	2.7366	0.2510
Q11	3.8200	0.0454

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	7.527293	8	0.940912	9.788549	9.53E-08	2.152133
Within Groups	4.325567	45	0.096124			
Total	11.85286	53				

Null Hypothesis 6: There was no difference in the collective average ratings (teacher responses) to survey sub-questions when considering grade level and subject matter taught.

For Null Hypothesis 6, the researcher calculated average ratings for each sub-question for all categories across each teacher group represented in the survey results. The researcher then applied an ANOVA and compared the resulting *F*-value and *F*-critical value (see Table 14). For Null Hypothesis 6, the *F*-value was less than the *F*-

critical value. The researcher failed to reject the Null Hypothesis and concluded there was no difference in the collective average ratings to survey sub-questions when considering grade level and subject matter taught.

Table 14

ANOVA Results for Null Hypothesis 6

ANOVA: Single Factor

SUMMARY

Groups	Count	Sum	Average	Variance
6th grade ELA	60	191.650	3.194	0.247
7th grade ELA	60	195.540	3.259	0.316
8th grade ELA	60	196.500	3.275	0.277
6th grade Math	60	185.500	3.092	0.572
7th grade Math	60	187.500	3.125	0.700
8th grade Math	60	185.500	3.092	0.428

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.027	5	0.405	0.958	0.444	2.239
Within Groups	149.845	354	0.423			
Total	151.872	359				

While the results of the ANOVA did not show a significant difference in the average ratings of sub-questions between the six teacher groups, there was an observable difference. When placing the average ratings for the six groups in order from highest to lowest, there was an observable difference in average ratings between teachers of sixth grade ELA, seventh grade ELA, eighth grade ELA, sixth-grade math, and teachers of

seventh-grade math, and eighth-grade math (see Table 15). The researcher noticed all ELA groups had a higher average rating than all Math groups.

Table 15

Average Ratings by Teacher Group

Groups	Sum	Average
8th grade ELA	196.50	3.275
7th grade ELA	195.54	3.259
sixth grade ELA	191.65	3.194
7th grade Math	187.50	3.125
sixth grade Math	185.50	3.092
8th grade Math	185.50	3.092

The researcher also saw observable differences in the average variance by teacher group. When placing the average variance in ratings for the six groups in order from highest to lowest, there was an observable difference in average variance between the same two groups of teachers: those teachers of sixth grade ELA, 7th grade ELA, 8th grade ELA, sixth-grade math, and teachers of seventh-grade math, and eighth-grade math (see Table 16). In addition, the variance in ratings by teacher group was higher among math teacher groups than ELA teacher groups.

Table 16

Average Variance in Ratings by Teacher Group

Groups	Count	Sum	Average	Variance
7th grade Math	60	187.50	3.125	0.700
sixth grade Math	60	185.50	3.092	0.572
8th grade Math	60	185.50	3.092	0.428
7th grade ELA	60	195.54	3.259	0.316
8th grade ELA	60	196.50	3.275	0.277
sixth grade ELA	60	191.65	3.194	0.247

Null Hypothesis 7: There were no differences between the average ratings (teacher responses) of individual sub-questions without regard to categories, grade level, or subject matter taught.

Testing Null Hypothesis 7 was similar to testing Null Hypothesis 6, but did not consider grade level or content taught by responding teachers. The researcher calculated the average rating of all responses for individual sub-questions and applied an ANOVA (see Table 17). The averages and variances used to calculate the results are located in Appendix E. The results showed an *F*-value greater than the *F*-critical value. For this reason, the researcher rejected the Null Hypothesis. There was enough evidence to support the claim of differences between the average rating of individual sub-questions without regard to categories, grade level, or content taught.

Table 17

ANOVA for Null Hypothesis 7

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	100.006	59	1.695	9.804	0.000	1.366
Within Groups	51.866	300	0.173			
Total	151.872	359				

Upon rejection of the Null Hypothesis, the researcher looked more closely at the topics scoring the highest and lowest within the sub-questions. In addition to the high-scoring question previously discussed, teacher survey responses showed high average ratings on four of the five statements connected to teacher perceptions on factors important to student achievement and five of the 11 statements on teacher perceptions on student beliefs important for school success. The final three sub-questions falling in the top 25% included two on teacher perceptions on the frequency of growth mindset practices used in the classroom and one on statements encouraging students to learn with a growth mindset. Some of the sub-questions falling in the lowest 25% of sub-questions included two additional statements on teacher perceptions of factors important for student achievement and student beliefs important for school success, three statements concerning an association with students' growth mindset, and a statement on the individual's perception on the level of integration put into teaching expectations and practices. The remaining statements requested teacher perceptions on statements that did not foster a growth mindset and level of agreement or disagreement with statements about mindset used by self, peers, and administrators.

Summary

In Chapter Four, the researcher detailed the quantitative results aligned to the seven null hypotheses. Data led to the rejection of some null hypotheses, while failing to reject others. Based on the analysis of the data connected to Tier 3 instruction in middle school reading and math, the researcher failed to reject the Null Hypotheses for either content and concluded there was not enough evidence to support the claim stating there was a difference in the academic growth of students who received Tier 3 instruction and those who did not receive Tier 3 instruction.

Additional comparisons made with student academic growth examined possible differences between the academic growth of grade levels in ELA and Math. Student growth on the aReading, aMath, and CBM-Math Process between sixth and seventh-grade students, sixth and eighth-grade students, and seventh and eighth-grade students were not significant. The results of the CBM-Reading assessment showed no significant difference when comparing sixth and seventh grade or sixth and eighth grade, but a significant difference in the academic growth of seventh-grade students compared to eighth-grade students existed.

Lastly, the researcher collected teacher responses on perceptions of mindset with students in the classroom. The data collected showed significant differences in the average teacher ratings by grade level and content area when looking at the responses to each category of sub-questions on the survey and differences in teacher responses to individual sub-questions with no regard for grade level or content taught. The data failed to show a significant difference in the average teacher ratings for individual sub-questions when grouping responses by grade level and content taught.

Chapter Five included a discussion of the results, connection to the existing information found in the research, and implications for future application and studies.

Chapter Five: Discussion

Introduction

Since the signing of NCLB, educators engaged in countless efforts to improve academic outcomes for all students. Despite significant investments of time, money, and staff, student outcomes in the state of Missouri did not show the growth called for by state accountability plans (MODESE, 2018a). The purpose of the study was to examine the RTI framework and teacher perceptions of mindset and mindset practices at the middle school level.

The RTI framework was a three-tiered structure designed to provide appropriate support for students with varying academic, social, and emotional needs. The highest level of support available to students with severe and persistent learning or behavioral needs within the RTI framework was Tier 3 instruction (CMTSS, 2021a). In addition, Fuchs et al. (2010) proposed RTI implementation practices at the elementary level may not translate when implementing the framework at the secondary level. A lack of research around RTI at the secondary level as well as the noted lack of progress in meeting standards of proficiency, specifically at the middle school level, led the researcher to compare the academic growth in a like groups of students who received and did not receive Tier 3 instruction in math and reading.

Acknowledging the complexity of improving academic outcomes for all students, the researcher also chose to examine differences in academic growth by grade level at the middle school level and teacher perceptions regarding mindset and student academic achievement. The initial idea was the exploration of possible relationships between middle school academic growth shown in district administered assessments and teacher

perceptions of mindset as measured by a survey. Unfortunately, the data obtained from the survey was not enough to support the researcher's ability to reject or not reject the initial hypotheses regarding possible relationships. The researcher shifted the work and used the available student data to investigate differences in the academic growth of a like groups of students in sixth, seventh, and eighth grade in reading and a like group of students in sixth, seventh, and eighth grade in math. The data from the teacher survey informed hypotheses exploring differences in teacher responses across grade and content area groups and at the individual level.

Response to Intervention and Middle School Reading and Math

Discussion

In response to a lack of academic growth in middle school students, the researcher looked closer at the differences in academic development between students receiving the highest level of academic support (Tier 3) and students receiving no additional support. The data collected presented information important in educators' ongoing decisions regarding structures, allocations of resources, and, most importantly, student learning. The researcher decided to discuss the results for both Null Hypothesis 1 and 2 together because decisions regarding the use of RTI at the middle school level were not likely to be made by content area but made by level. The conclusions drawn from the study added to the body of research on using the RTI framework at the secondary level.

As stated in Chapter Four, the results from the assessments in reading and math collectively did not provide enough evidence to support a claim that a difference in the academic growth of students who received Tier 3 instruction differed from students who did not receive Tier 3 instruction. In theory, the lack of a difference between the two

groups could be a positive sign. Tier 3 instruction aimed to remediate existing problems and prevent further deficits from developing as a result (Ervin, 2009). If the system was performing as intended, one expected the growth of students receiving Tier 3 instructional support to be the same as or more than non-Tier 3 peers' academic growth. However, consideration of the literature on RTI and difficulties in implementing the model at the secondary level led the researcher to conclude no difference in academic growth between the two groups was a reason for further discussion.

In looking at the results in reading, the researcher saw relationships to previous studies on RTI at the elementary and secondary levels. In 2015, Balu et al. published findings showing no statistical difference in the growth of second and third-grade students who did and did not receive Tier 2 or Tier 3 instruction in reading. The study did find a difference for students in first grade. A closer look at the skills needed for students in first grade versus the skills needed for students in second and third grade showed possible reasons for the difference in results. According to Morin (2021a; 2021b), reading in first grade required letter recognition, matching sounds to letters, and sight words, while reading in third grade required students to read fiction texts and informational texts in core content areas such as science and social studies. The researcher saw parallels between the results found by Balu et al. (2015) and a study of literacy interventions at the secondary level. Ciullo et al. (2016) published a study where the growth of middle school students receiving Tier 2 and Tier 3 instruction was more significant in reading with narrative content than reading disciplinary content. The findings of each study suggested RTI could produce increased learning outcomes for some students in some situations, but

enough evidence existed to question the generalized application of the framework across levels and areas of academic learning.

The existing research, on RTI in math, was much less than existing research on RTI in reading, but the results shown in published studies matched the results found by the researcher. Two studies published in 2019 showed the failure of interventions to narrow the achievement gap in students receiving Tier 2 instruction as intended (Bouck & Cosby, 2018; Bouck et al., 2019). Collectively, the previous studies and the current study yielded results with no statistically significant difference between the growth of students who received additional supports during Tier 2 or Tier 3 instruction and the growth of students who did not receive additional support (Bouck & Cosby, 2018; Bouck et al., 2019). However, the researcher found results in one of the three math assessments examined did show evidence of a significant difference in the growth of students who did receive Tier 3 instruction from the growth of students who did not receive Tier 3 instruction. A closer look at the assessments led the researcher to draw a few possible reasons for the result. The assessments used in the study included curriculum-based measurements (CBM-Math Process and CBM-Reading), computer-administered adaptive assessments (aMath and aReading), and a monthly benchmark assessment (Evaluate). There was a statistically significant difference in growth between the two groups on the monthly Math benchmark assessment. Students who did not receive Tier 3 instruction showed more growth than students who received Tier 3 instruction on Evaluate. The researcher considered possible reasons for the results to differ and found a few possibilities. Students only took the CBM and adaptive assessments in the fall, winter, and spring, but Evaluate assessments occurred every month, September through April

(RSD, 2018). In informal conversation, the researcher heard teachers express frustration with student effort and inconsistent performance on the month-to-month Evaluate assessment. Teachers discussed ways to increase engagement and motivate students when administering the monthly assessment (Teachers, personal communications, January 2020). The user guide provided by Catapult Learning (2016) showed the different question formats students saw on the assessment and outlined the need for students to scroll, navigate questions with multiple parts, and use drag and drop features. The researcher believed any one of the reasons listed above could account for the differences in the data for the benchmark assessment. As a reminder, Tier 3 students were students with severe and persistent learning needs. Students who struggled with the content presented may have experienced different struggles when navigating the various components of Evaluate questions. The researcher believed the completion of the assessment was more difficult for Tier 3 students when compared to the students not receiving Tier 3 instruction. The researcher noticed a similar difference in performance on the ELA assessments. While no statistically significant difference surfaced, the *p*-value for ELA Evaluate was closer to the α-value of 0.05 than the *p*-values for the CBM-Reading or aReading. In summary, the pattern in the results left room for additional research on the connections between student growth and test structure for students who did and did not struggle academically.

One other possibility occurred to the researcher while reviewing the existing literature and the study results. Existing research questioned the methods used to identify students for interventions at the secondary level. If the process for identifying students was not appropriate for secondary students, questions on the number of students who did

not receive additional support because the need did not present on the screener were valid. Pyle and Vaughn's 2012 study showed students with significant reading struggles who did not receive Tier 3 instruction showed a substantial decrease in reading performance. Therefore, the researcher concluded unidentified struggling students would show less growth or possible regression in a school year than students who received Tier 3. Mixing the outcomes for unidentified struggling students with students not struggling would have influenced the results for the academic growth of students who did not receive Tier 3 instruction and subsequently the comparison of Tier 3 and non-Tier 3 student groups in the study.

Recommendations

In Chapter Two, the researcher outlined multiple barriers expressed in the literature regarding implementation of the RTI framework at the secondary level (Bouck & Cosby, 2018; Ciullo et al., 2016; Fuchs & Fuchs, 2017; McEwin & Green, 2010; Prewett et al., 2011). Two of the barriers mentioned were not an issue in the researched school district: a way to structure the middle school schedule to accommodate time for Tier 3 instruction and time for staff to meet regularly to make the data-based decisions required for successful implementation. According to conversations with school leadership in the researched school district, the existing middle school schedule provided both (School Leaders, personal communications, August 2019). There were no recommendations connected to the scheduling component of the implementation. Instead, the researcher chose to align recommendations with the questions posed by Fuchs et al. (2010).

One recommendation to the researched school district would be the examination of the screening and identification process used to select students for Tier 2 and Tier 3 instruction. The current RTI process used the same screener for students in kindergarten through eighth grade. The screeners were labeled to be grade-level specific, but the researcher would recommend examining the content in the middle grades, especially in reading, considering the different secondary and elementary curricula requirements. The research called attention to the conceptually different approach of the secondary curriculum from the elementary curriculum and changes in the pattern of growth in secondary students (Ciullo et al., 2016; Pyle & Vaugh, 2012). In addition to examining the screening tool, educators needed to look at what other data types entered the conversation selecting students for intervention and how each weighted against the screener. Such data included student engagement, attendance, referrals, and suspensions. The research specifically mentioned the link between student engagement and low academic performance as a crucial consideration for secondary students (Gorski, 2016; Meyer, 2015). If current practices incorporated elements outside the screener, consideration of when and how the sources entered the conversation about student placement was next.

The next recommendation was a look at the process used to determine when a student moved from Tier 2 to Tier 3 instruction. The practice outlined in the district's RTI plan required 12 weeks of instruction at Tier 2, yielding inadequate growth, to take place before Tier 3 placement. The research suggested the accumulated academic deficits of secondary students created difficulties in seeing students' responsiveness to the lower level (Tier 2) supports (Fuchs et al., 2010). A proposed method to address the difference

in secondary students was to apply the Brief Experimental Analysis (BEA) discussed by the 2015 study of Reisener et al. and discussed in Chapter Two. The researcher recommended secondary leadership, in the researched school district, consider applying BEA to expedite the identification of students in need of more intensive intervention quicker than existing practices.

The final recommendation of the researcher to the researched school district was the examination of results produced by individual resources or programs used for Tier 3 intervention. The research spoke about the difficulty in aligning the needs of the secondary student to an intervention and the fidelity of implementation to intervention programs (Gersten et al., 2017; Meyer, 2015). The researcher posed questions to middle school teachers responsible for delivering Tier 3 instruction and school leadership on the ability of existing programs to address the accumulated deficits of struggling secondary students across both subcomponent skills and content areas, engage the struggling learner at high levels, and the level of fidelity to the existing programs. In addition, the RTI framework started in the researched school district over 10 years before the 2019-2020 school year. However, the district's 2018 Response to Intervention Plan did not include information about a process for regularly reviewing and revising the interventions used at any level. From the year 2010 to the year 2020, the field of education experienced the change from state standards to the widely adopted Common Core State Standards and back to a revised set of state standards. According to the Common Core State Standards Initiative (2022) information, the standards included fundamental shifts in math and ELA and aligned to college and career expectations. If existing intervention programs lacked review since implementation began, the change in standards alone necessitated a review,

providing an additional need for regular examination of the outcomes of students in connection to the intervention programs applied.

Middle School Academic Growth by Grade Level

Discussion

At the time of the study, the use of multi-tiered systems of support, such as the RTI framework, approached the 20-year mark, but the use of the middle school model had support and documentation dating back 60 years (Lounsbury, 2009). The documentation held no shortage of criticism for the middle school model, including a focus on decreased student performance the year following a student's transition from an elementary setting to a middle school setting (Alspaugh, 1998; Rockoff & Lockwood, 2010; Snipes & Jacobson, 2021; West, 2012). Given the attention research paid to academic growth at the middle school level, the researcher investigated differences in the academic growth alike groups of students in sixth, seventh, and eighth grade ELA and math.

Returning to the results reported in Chapter Four, the researcher found only one instance of statistical difference when comparing sixth grade to seventh grade, seventh grade to eighth grade, and sixth grade to eighth grade in ELA and the same grade level pairs in math. There were 12 comparisons across the three different grade level pairs and two assessments for each content area. The only statistical difference was in the academic growth of seventh and eighth-grade students on the CBM-Reading assessment.

Before discussing the outlier, the researcher examined the lack of difference in growth found in the study alongside the performance of sixth, seventh, and eighth-grade students on Missouri's grade level math assessment at the state and researched school

district level (MCDS, 2022; Researched School District, 2020). The researcher saw minor differences in the percent of students scoring proficient and advanced in both the state and researched school district's data for sixth and seventh-grade math, supporting the results found for all four of the comparisons made in the study's sixth and seventh grade student growth data. The percent of students scoring advanced or proficient in eighth-grade math was significantly less than the percent of sixth and seventh-grade students scoring advanced or proficient at the researched school district and state level. However, the researcher included information in Chapter Two about the various practices in end-of-year state assessments for districts offering Algebra I to eighth-grade students (Middle School Principal, personal communications, March 15, 2021). The variation in practices created a scenario where the differences in student achievement from seventh to eighth grade or sixth to eighth grade data on the grade-level assessment were not comparable. All students regardless of eighth-grade math placement, took the district wide FastBridge assessments and the students represented in the grade-level assessment were not all-inclusive. The students' academic growth data from the FastBridge Assessments provided the only available reflection of the growth of eighth graders compared to sixth or seventh-grade students.

In the ELA data from the Missouri grade-level assessment, the researcher saw slight differences in the percent of students scoring proficient and advanced in the state ELA data for grades six, seven, and eight, supporting the results found for five of the six comparisons made in the study's ELA student growth data. The patterns in the percent of students scoring proficient and advanced in the researched school district's ELA data for grades six, seven, and eight showed a minimal difference between sixth and seventh

grade data, but a more considerable difference when comparing sixth grade and eighth grade data or seventh and eighth grade data (Researched School District, 2020). The slightly larger dip in the percent of eighth-grade students scoring advanced and proficient suggested students in eighth grade did not obtain the same amount of grade-level content assessed on the grade-level assessment as students in sixth and seventh grade. The researcher considered the differences shown in the researched school district's eighth grade state assessment data a support to the finding of a significant difference in the growth of seventh and eighth-grade students on the CBM-Reading in the study.

Further reflection drew additional connections between the data results in the study and the research on adolescent learners. One of the pieces of information in the literature which resonated with the researcher was the mention of the span in both physical development and academic achievement present in middle school classrooms. According to the NMSA, an eighth-grade classroom had the possibility of a "six- to eight-year span in physical development among students, and in seventh-grade classrooms, there is a six- to eight-year span in academic achievement" (NMSA, 2003 pp. 9-10). Therefore, the level of academic achievement in grades six, seven, and eight was not the same for each student, or even predictable according to chronological age. The individual development of adolescents was tied closer to pubertal stage (Jansen & Kiefer, 2020). Looking for a difference in students' academic growth based on grade level, which mostly aligned with chronological age, was not the best approach given the variance in all areas of development for a single grade at the middle school level. The information did bring merit and support for educators to pursue a holistic implementation of the middle school framework as described in the research to yield benefits to the adolescent

learner (Alverson et al., 2019; Ellerbrock et al., 2018; Lounsbury, 2009; Olofson & Knight, 2018).

Recommendations

Similar to the criticism of the RTI model at the secondary level, research on the middle school structure, middle school student achievement, and the adolescent learner spoke to the challenges with implementation of the practices advocated for by experts (Alverson et al., 2019; Caskey & Anafara, 2014; Jansen & Kiefer, 2020; Robinson, 2017; Salyers & McKee, 2010; Wilson & Horch, 2002). The results discussed above did not yield the need to address how student achievement in one grade level differed over student achievement in another grade level, but the researcher decided the situation provided an opportunity to restate and reinforce the unique needs of students in all grades discussed – sixth, seventh, and eighth graders. The recommendations made below aimed to support the existing work in the researched school district's middle schools, guide open discussion about opportunities for improvement, and inform decisions made when hiring middle school staff in the future.

The literature on the middle school model identified specific structures necessary for implementing the model, and most were present in the middle schools of the researched school district. An examination of the schedule for each building showed evidence of a robust exploratory program, strong advising and counseling for all students, and built-in time for teachers to plan cooperatively. All these elements and the fact that all sixth, seventh, and eighth-grade students were placed on teams to create small and more intimate relationships existed in the literature as key elements of the middle school model (Alverson et al., 2019; Olofson & Knight, 2018). The recommended elements less

evident during the study were the ways teachers applied diverse instructional strategies, delivered a responsive curriculum, and used evaluation methods compatible to meet the unique needs of the adolescent learners. In considering a place to begin reflection, the researcher recommended seeing how the existing methods for evaluating student learning aligned with the literature on the changes in adolescents' intellectual, social-emotional, and physical development. Factors such as an increased capacity for abstract thought, ability to argue a position, possession of a strong sense of fairness, and periods of fatigue and restlessness related to student behavior in the classroom and influenced how a student approached classroom tasks (Flavell & Piaget, 2011; Kellough & Kellough, 2008; Salyers & McKee, 2010). Student choice was another strong theme in the literature (Caskey & Anafara, 2014; Robinson, 2017). Collectively, the information needed to influence some of the methods used to evaluate student learning while still preparing students for the traditional and standardized assessments required by educational policy (MODESE, 2022).

With further consideration of adolescent learners, the researcher returned to the calls across the literature for committed and knowledgeable teachers of students aged 10-14 (Alverson et al., 2019; DiCicco et al., 2016; Olofson & Knight, 2018). Chapter Two detailed the wide range of changes for students during adolescence and noted the idea of changes in development during the period exceeding all other times of life outside of the first two years of life (Caskey & Anafara, 2014). Educational leaders were responsible for selecting staff for middle school teaching positions. Leadership needed to incorporate criteria tailored to the specific needs of the middle school learner and classroom and anchored in the characteristics essential to the implementation of the middle school

model. The research acknowledged teacher shortages and alternative certification programs created to alleviate shortages, and middle school leaders hiring staff faced difficult decisions when facing small candidate pools for middle school classroom positions (DiCicco et al., 2016). In scenarios where staff meet certification requirements through alternative methods and professional development on adolescent development, staff needed additional support during the first few years of teaching on middle level curriculum, instructional practices, and subject matter. The Association for Middle Level Education published a white paper by Hale in August of 2019 discussing the preparation and credentialing of middle level teachers. The document and accompanying standards for middle level teacher preparation guided staff responsible for professional development and teacher mentorship programs (AMLE, 2012). The researcher noted the published standards were under review and revised standards expected soon on AMLE's website (AMLE, 2019).

Teacher Perceptions of Mindset and Mindset Practices

Discussion

Chapter Four outlined the results of a survey administered to all teachers of ELA and math in grades six, seven, and eight across the two middle schools in the researched school district. The survey gathered information on teacher perceptions of mindset and mindset practices. The Null Hypotheses connected to the survey looked for differences in ratings across categories and sub-questions with and without regard for teachers' grade level and content. The data comparing the average ratings by category revealed evidence of a statistically significant difference, which was a positive sign. The questions on the survey asked for a variety of pieces of information wherein a high rating on some

questions showed a positive perception of growth mindset and a high rating on other questions showed a negative perception. Differences across categories showed a consistent thought pattern regarding growth mindset across question categories. When looking for differences in average sub-question ratings, the researcher found no statistical difference when looking at sub-question results by teacher group (grade level and content) but did find statistical differences in the responses to sub-questions without regard for teacher groups. The differences in sub-question ratings combined with details of the highest and lowest rated sub-questions revealed two points of discussion: teacher perceptions of growth mindset and the skills of teachers to encourage a growth mindset in students.

The responses recorded by survey participants provided encouraging evidence of teachers' understanding of growth mindset and the correlations between growth mindset characteristics and student beliefs and achievement. There was a high level of agreement with statements aligned to the information presented in Chapter Two on the attributes and associated behaviors of students with a growth mindset (Boyett, 2019; Dweck, 2007; Seaton, 2018). Teachers agreed students should believe learning can come from failure, academic abilities increase through effort, and in the ability to learn challenging material and try new things in school. The literature spoke of students with a growth mindset using similar descriptions such as being willing to take risks, welcome challenges, and learning from mistakes (Boyett, 2019; Dweck, 2007). High ratings also appeared in sub-questions regarding the importance of a growth mindset with students and an association between the possession of a growth mindset and evidence of excitement for learning and a high level of effort and persistence in schoolwork. In addition, teachers rated statements

concerning the idea all students can and should have a growth mindset, growth mindset to improve student learning, and identifying the role of the teacher in fostering a growth mindset in students with a high level of agreement. Multiple studies discussed in Chapter Two identified a positive connection between growth mindset and academic outcomes (Claro et al., 2016; de Kraker-Pauw et al., 2017; Dweck, 2007; Dweck, 2008; Zalaznick, 2018; Zeeb et al., 2019). The collection of highly rated sub-questions in the teacher survey led the researcher to conclude middle school teachers in the researched school district understand the possibilities and implications of students' holding a growth mindset in the classroom.

The second point of discussion was the evidence of teacher skills for fostering and encouraging a growth mindset through classroom and feedback practices. While results for statements about how the integration of growth mindset practices improved the instruction provided showed a high level of agreement, other results revealed the need for additional teacher support. Seaton stated, “mindset may fluctuate from one activity to the next depending on both internal and external ecological systems which interplay or even the subject or activity assigned that day” (2016, p. 43). In the best of situations, teachers needed preparation for scenarios where students did not hold a growth mindset. The survey responses from teachers acknowledged a lack of skill in fostering a growth mindset and a need for more solutions and strategies when students did not have a growth mindset.

Additionally, specific sub-question results revealed teacher feedback practices that did not foster a growth mindset. In 2013, Gutshall concluded praise for effort grew resiliency and persistence in students, while praise for ability, or intelligence, undermined

the two. In three sub-questions, teachers reported using statements praising ability a few times a week. However, the researcher found encouragement in the responses to two other sets of sub-questions. Teachers reported using statements praising effort with a higher frequency than the ability statements, and teachers believed statements such as "look how smart you are" and "see, you are good at this subject" to be ineffective in encouraging students to learn with a growth mindset. The researcher concluded teachers in the researched school district desired to implement and use growth mindset practices to improve instruction but needed some additional learning on the tactical application of the work in day-to-day teaching situations.

When the sub-questions data was grouped by grade level and content area and then ranked, the researcher made one additional observation. The average ratings by sub-question for all ELA teachers were higher than the average ratings for all Math teachers. The results were unexpected by the researcher. The researcher had a few different conversations with middle school leaders when obtaining permissions, email addresses, and other pieces of information needed for the study (School Leaders, personal communications, December 2020). The conversations resulted in additional information and insights into the middle school buildings. When discussing the mindset component of the study, each building principal showed interest in the results because of mindset work completed with math teachers in the previous few years. According to the district's professional development coordinator, the math curriculum went through recent revisions, and as a part of efforts supporting teachers, professional development and the sharing of open-source classroom resources occurred (Professional Development Coordinator, personal communications, January 2020). The researcher expected the

average ratings from math teachers to be higher than the ELA peers. Reflection on the details of the survey and a closer look at some of the questions where lower ratings showed higher support for growth mindset practices led to a few conclusions. The math teacher responses to statements on using ability feedback were low, lower than the responses of ELA teachers. The math teachers' responses were also lower on the reported frequency of using feedback on ability. The combination of lower results on some sub-questions contributed to the slightly lower average in math teachers' ratings than ELA teacher responses. In addition, the responses of math teachers had lower averages on two sub-questions which asked for teachers' perceptions on the ease of teaching students who believed in fixed intelligence and students with innate ability in the subject taught. The researcher determined the recent education and training math teachers received on mindset created a higher level of awareness about teaching students with these attributes, leading to the perception revealed in the data.

Recommendations

Based on the survey data, the researcher recommended the researched school district integrate additional learning on fostering growth mindset with students through classroom practices. Teachers clearly believed in the value of the work related to student learning and achievement but did not feel well equipped. The researcher believed the best place to deepen teacher knowledge was on the feedback provided to students. Multiple studies on mindset showed more positive outcomes for students when teachers used feedback focused on effort instead of ability (Dweck 2007; Dweck 2008; Gutshall, 2013, Zeeb et al., 2019). Middle school leaders needed to keep in mind reports on the difficulty teachers had in giving feedback which rewards effort but provides students with accurate

information related to content mastery (Zalaznick, 2018). The researcher advised the topic of feedback be integrated regularly into structured interactions with teachers and encouraged the work to include all instructional staff, not just the teachers of math and ELA.

Opportunities for Future Research

For future research, opportunities existed to expand the body of research on all topics addressed in the study. The researcher discussed the lack of research on RTI implementation at the secondary level and challenges in implementing the framework in the upper grades in Chapter Two. Recommended future studies should continue to compare the growth of students who do and do not receive Tier 2 or Tier 3 support. In replicating the work, the measures used for data on student growth should explore the use of classroom-level assessments or assessments different in format from the measures used here. Including a broader range of assessment types might provide a more complete picture of student growth over time and allow students to show what they know more at a higher rate through other methods. The researcher would also recommend conducting the study with a much larger group of students.

If the researcher replicated the mindset portion of the study, connecting teacher perceptions to observable data of mindset practices used during instructional time with students would expand the work. The teacher survey results showed positive perceptions regarding growth mindset and growth mindset practices, so pairing survey results with classroom observations seeking information on the frequency of practices that foster a growth mindset and those that do not foster a growth mindset could benefit the work of educational leaders. The researcher recommended expanding the study across a larger

population to gather more survey responses and explore the possibility of a relationship between teacher perceptions of mindset and student growth, the study's original intent.

Conclusion

At the time of the study the demand on educators to improve student outcomes continued, even in the face of a world navigating the fallout of the COVID-19 pandemic. Educators across the United States used the RTI framework to support students' varying academic and behavioral needs with differing results and mostly discouraging results at the secondary level. Finding no difference in the growth of students who received Tier 3 and students who did not receive Tier 3 meant the current application of RTI at the secondary level was not closing the gaps of struggling learners. The unique needs of the adolescent learner presented a reason for a different approach to support. Consequently, educational leaders needed to be bold in examining existing practices and ask questions to keep the needs of the learner at the forefront of the work. The students in classrooms today had little in common with the students in 2010 classrooms, 2015 classrooms, and even 2019 classrooms. The structures used to minimize and close gaps in learning should respond to both the needs of and the demands on today's students. The intricate, complex, and cumbersome processes outlined in the RTI framework need to be simplified to make it easier for the right students to receive the right support at the right time.

While finding positive outcomes from RTI was difficult, the study and research provided evidence of the possible implications of using growth mindset practices in the classroom. The research concluded a positive correlation existed between the use of growth mindset practices and student outcomes and should serve as a driver for pushing the work forward. Educators understand the outcomes associated with using a growth

mindset in the classroom but lack enough information and experience to sustain fostering growth mindsets in the face of natural variations in day-to-day tasks.

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Appendix A

Permission to Modify Published Mindset Survey

Re: 2016 Mindset in the Classroom Study: Seeking Permission
Sterling Lloyd <SLloyd@epe.org>
Tue 4/30/2019 9:50 AM
To: OPELA, STEPHANIE (Student) [redacted]
Cc: Holly Yettick <HYettick@epe.org>;
Hi Stephanie,

Thank you for your inquiry regarding the Mindset in the Classroom survey. Dr. Yettick asked me to respond. It will be fine for you to use the survey instrument for your research. Please cite the Education Week Research Center where appropriate based on customary research standards.

Sterling

Sterling C. Lloyd
Assistant Director
Education Week Research
Center 301-280-3100
slloyd@epe.org

From: OPELA, STEPHANIE (Student)
[redacted]:
Monday, April 29, 2019 7:21 PM
To: Holly Yettick
Cc: OPELA, STEPHANIE (Student)
Subject: 2016 Mindset in the Classroom Study: Seeking Permission

Dear Dr. Yettick,

My name is Stephanie Opela, and I am a doctoral student at Lindenwood University in St. Charles, Missouri. I recently came across the published study "Mindset in the Classroom: A National Study of K-12 Teachers" from 2016. The survey used to gather data for the study captures much of the same information that I want to obtain for my dissertation. I am seeking permission to use por8ons of the survey developed in the mindset study. May I use parts of the survey tool and make adaptations needed to fit my research?

Please let me know if you have any questions or need additional information from me. I look forward to hearing from you soon.

Sincerely, Stephanie Opela
EdD Student Lindenwood University

Appendix B

Modified Mindset Teacher Survey

Description of Growth Mindset Provided at Start of Survey: "This survey examines teachers' views regarding mindsets in K-12 education. Throughout the survey, we use the term "growth mindset" to identify one way of thinking about learning and intelligence. This concept may also commonly be referred to using different terminology, such as "learning mindset" or "incremental mindset."

Survey Question	Responses/Rating Scale
1. What grade level do you teach?	sixth grade 7th grade 8th grade
2. What subject do you teach?	ELA Math
3. How important are the following factors to student achievement? a. Student Engagement & Motivation b. Teaching Quality c. School Climate d. School Safety e. Social and Emotional Learning f. Parental Support and Engagement g. Use of Growth Mindset with Students h. School Discipline Policies i. Family Background	A Scale of 1 to 4 1-Not at All Important 2-Somewhat Important 3-Important 4- Very Important
4. To what extent do you agree that the following student beliefs are important for school success? a. They can learn from failure and are willing to try new things in school b. They can find help at school when they have difficulties c. Their work in school has value for them d. They can be successful in school e. They belong in the school community f. Administrators and teachers know students personally g. Their academic abilities will increase through effort h. They have the ability to learn challenging material	0-Strongly Disagree, 1- Disagree, 2-Neither agree nor disagree 3-Agree, 4-Strongly Agree

i. They have some autonomy and choice in the topics they study j. Administrators and teachers treat all students equally and fairly k. Doing well in school will lead to a good career	
5. How easy or difficult do you believe it is to teach students with the following characteristics? Students who… a. Have grit and perseverance b. Believe that intelligence is malleable c. Have an innate ability in the subject you teach d. Believe that intelligence is fixed or static	0- Very Difficult, 1- Difficult, 2-Neither Easy or Difficult, 3-Easy, 4-Very Easy
6. To what extent do you agree that the following are associated with a student's growth mindset? a. Excited about learning b. Persistence in schoolwork c. High levels of effort on schoolwork d. Frequent participation in class discussions e. Good Attendance f. Consistent completion of homework assignments g. Frequent participation in extracurricular activities h. Good course grades i. High Standardized test scores	0-Strongly Disagree, 1- Disagree, 2-Neither agree nor disagree 3-Agree, 4-Strongly Agree
7. To what extent do you agree with the following statements? a. All students can and should have a growth mindset b. Fostering a growth mindset in students is part of my job duties and responsibilities c. I am good at fostering a growth mindset in my students d. Administrators at my school are good at fostering a growth mindset in students e. Other teachers at my school are good at fostering a growth mindset in students f. I have adequate solutions and strategies to use when students do not have a growth mindset	0-Strongly Disagree, 1- Disagree, 2-Neither agree nor disagree 3-Agree, 4-Strongly Agree

8. How often have you engaged in the following practices in your typical classroom? **Fosters growth Mindset:** a. Praising students for their effort b. Encouraging students who are already doing well to keep trying to improve c. Encouraging students to try new strategies when they are struggling d. Praising students for their learning strategies e. Suggesting that students seek help from other students on schoolwork **Does not foster growth mindset:** f. Telling students that it is alright to struggle, not everyone is good at a given subject g. Praising students for their intelligence h. Praising students for earning good scores or grades i. Encouraging students by telling them a new topic will be easy to learn	0-Never, 1-A Few Times a Year, 2-A Few Times a Month, 3-A Few Times a Week, 4-Every day
9. How effective are these statements in encouraging students to learn with a growth mindset? **Fosters growth Mindset:** a. I really like the way you tried all kinds of strategies on that problem until you finally got it. b. You really studied for your test and your improvement shows it. c. I love how you stayed at your desk and kept your concentration in order to keep working on that problem. d. Great job. You must have worked really hard on this. **Does not foster growth mindset:** e. See, you are good at this subject. You got an A on your last test. f. Look at how smart you are. g. You are one of the top students in the class. h. This is easy, you will get this in no time.	A Scale of 1 to 4 1-Not at All Effective 2-Somewhat Effective 3-Effective 4- Very Effective
10. To what extent have you integrated growth mindset into your teaching expectations and practice?	A Scale of 1 to 4 1-Not at All Integrated 2-Somewhat Integrated 3-Integrated 4- Deeply Integrated

11. To what extent do you agree that integrating growth mindset into your teaching will produce the following results? a. Improve student learning b. Improve my own instruction and classroom practice c. Significantly change my classroom instruction	0-Strongly Disagree, 1- Disagree, 2-Neither agree nor disagree 3-Agree, 4-Strongly Agree

Appendix C

Survey Participant Recruitment Email

Hello,

Many of you know me as a member of the Department of Curriculum & Instruction, but you may not know I am also pursuing my EdD at Lindenwood University. For my dissertation, I am investigating relationships between student academic growth and teacher perceptions of mindset. I would like to invite you to complete a brief survey in your role as a middle school teacher of ELA or Math. Your participation is voluntary. You may choose not to participate or withdraw at any time by simply not completing the survey or closing the browser window.

Please see the attached survey research information sheet for additional information and survey link. If you have any remaining questions, please do not hesitate to contact me or one of the other contacts listed in the attached document.

Thank you for your time and consideration,

Stephanie Opela

Appendix D

Participant Consent Form

LINDENWOOD

Survey Research Information Sheet

You are being asked to participate in a survey conducted by Stephanie Opela at Lindenwood University. We are doing this study to investigate a possible relationship between student academic growth and teacher perceptions of mindset. It will take no more than 15 minutes to complete this survey.

Your participation is voluntary. You may choose not to participate or withdraw at any time by simply not completing the survey or closing the browser window.

There are no risks from participating in this project. We will not collect any information that may identify you. There are no direct benefits for you participating in this study.

WHO CAN I CONTACT WITH QUESTIONS?

If you have concerns or complaints about this project, please use the following contact information:

Stephanie Opela [redacted] OR [redacted]

Dr. Lynda Leavitt [redacted]

If you have questions about your rights as a participant or concerns about the project and wish to talk to someone outside the research team, you can contact Michael Leary (Director - Institutional Review Board) at [redacted] or [redacted]

By clicking the link below, I confirm that I have read this form and decided that I will participate in the project described above. I understand the purpose of the study, what I will be required to do, and the risks involved. I understand that I can discontinue participation at any time by closing the survey browser. My consent also indicates that I am at least 18 years of age.

You can withdraw from this study at any time by simply closing the browser window. Please feel free to print a copy of this information sheet.

SURVEY LINK WENT HERE

Appendix E

ANOVA Averages and Variances for Null Hypothesis 7

ANOVA: Single Factor

SUMMARY

Groups	*Sum*	*Average*	*Variance*
Q3_1	22.920	3.820	0.045
Q3_2	21.670	3.612	0.141
Q3_3	22.160	3.693	0.049
Q3_4	20.410	3.402	0.294
Q3_5	22.580	3.763	0.151
Q3_6	19.910	3.318	0.284
Q3_7	20.000	3.333	0.044
Q3_8	21.000	3.500	0.078
Q3_9	15.410	2.568	0.334
Q4_1	21.170	3.528	0.105
Q4_2	22.910	3.818	0.034
Q4_3	21.080	3.513	0.134
Q4_4	22.670	3.778	0.063
Q4_5	20.750	3.458	0.238
Q4_6	21.500	3.583	0.119
Q4_7	21.590	3.598	0.062
Q4_8	21.750	3.625	0.021
Q4_9	18.410	3.068	0.300
Q4_10	18.670	3.112	0.207
Q4_11	18.920	3.153	0.106
Q5_1	19.340	3.223	0.118
Q5_2	18.660	3.110	0.197
Q5_3	18.670	3.112	0.341
Q5_4	10.580	1.763	0.051
Q6_1	21.370	3.562	0.123
Q6_2	20.330	3.388	0.141
Q6_3	21.000	3.500	0.112
Q6_4	20.170	3.362	0.349

Q6_5	20.450	3.408	0.336
Q6_6	18.410	3.068	0.034
Q6_7	16.750	2.792	0.210
Q6_8	16.910	2.818	0.184
Q6_9	14.000	2.333	0.244
Q7_1	20.250	3.375	0.121
Q7_2	19.420	3.237	0.051
Q7_3	16.580	2.763	0.217
Q7_4	14.080	2.347	0.206
Q7_5	16.340	2.723	0.186
Q7_6	15.750	2.625	0.355
Q8_1	23.830	3.972	0.005
Q8_2	22.000	3.667	0.167
Q8_3	20.160	3.360	0.304
Q8_4	20.410	3.402	0.062
Q8_5	18.500	3.083	0.053
Q8_6	19.500	3.250	0.119
Q8_7	17.750	2.958	0.288
Q8_8	19.160	3.193	0.117
Q8_9	13.840	2.307	0.483
Q9_1	21.580	3.597	0.107
Q9_2	16.920	2.820	0.129
Q9_3	18.750	3.125	0.137
Q9_4	17.750	2.958	0.488
Q9_5	14.250	2.375	0.094
Q9_6	13.500	2.250	0.475
Q9_7	12.840	2.140	0.372
Q9_8	10.660	1.777	0.152
Q10_1	16.420	2.737	0.251
Q11_1	24.000	4.000	0.000
Q11_2	24.000	4.000	0.000
Q11_3	21.830	3.638	0.183

Vitae

Stephanie M. Opela

Stephanie Opela holds a Bachelor of Science in Human Environmental Sciences from Oklahoma State University, a Master of Science in Educational Administration from Walden University, and an anticipated Doctorate of Education (2022) with an emphasis in curriculum and instruction from Lindenwood University.

Stephanie began her career teaching in a multi-age preschool classroom in an urban school district near St. Louis, Missouri, in 2002. During her time as a classroom teacher, she served in multiple teacher leadership roles, including the facilitation of a new teacher mentorship program. Stephanie transitioned into a full-time leadership position in 2011 to expand her work as an instructional leader to serve as an instructional facilitator in the same school district. The opportunities the role provided led to a passion for training and supporting adult learners and the work involved in developing, revising, and implementing educational programs. Stephanie now works in a corporate training role, where she applies her deep understanding of cohesive curricula to support leaders and staff across all levels.