THE IMPACT OF LITTLE KIDS ROCK MODERN BAND PROGRAMS ON ELEMENTARY MATHEMATICS ACHIEVEMENT

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Overwhelming evidence supports the fact that music instruction greatly increases academic achievement on standardized test scores at the elementary, middle and high school level. When school districts face budget deficits, typically they alleviate the shortfall by eliminating music programs. Currently in Dallas ISD, teacher salaries are affected by how well a student performs on the STAAR exam. In this quantitative, causal-comparative study, 5th grade music STAAR mathematics scores are investigated to discover if instrumental music instruction using the Little Kids Rock Modern Band method improves academic achievement on the STAAR exam.

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I wish to acknowledge the following people for assisting me in this tremendous endeavor. I dedicate this dissertation to my parents, Allie and Nathaniel Buckner. I thank you for being persistent and insistent that I continue piano lessons. “Smoke Gets in Your Eyes” was not on my top 10 piano repertoire playlist at that time; however, I have developed an appreciation for this genre of music. Their unyielding love, support and encouragement throughout this process was more than appreciated. I thank Reginald Hayes and Stan Stanton who had the foresight to encourage me to pursue this doctoral degree. I thank Johnnetta Hudson, who laid down the law and the path to attain this degree. Special thanks to William Camp, R. Jefferson George, Barbara Pazey, Bryan Powell, Misty Sailors, Randy Bomer, Victor Prybotok, James Laney, Demetruia Ennis-Cole, Joseph Oppong, and Marta Krader. James Bogle, thank you. You continue to make an indelible mark on the world of classical guitar music. You are the reason I teach guitar today. Bryan, thank you for your insight with the Little Kids Rock Modern Band program. So many instruments have been placed into students’ hands because of this awesome program. A very special thanks to Bradley Olesen, former director of choral, general, and elementary music of Dallas ISD. I appreciated your willingness to help me. And to the committee and dear friends, I could not have reached the pinnacle of my educational pursuit if it had not been for the advice, assistance, encouragement, and of course, patience from everyone.

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CHAPTER 1

INTRODUCTION

Music has become a vital part of education across the United States. The benefits of music programs were significant ranging from improved attendance rates (National Association for Music Education [NAfME], 2015) and improved test scores in reading and mathematics (Johnson & Memmoth, 2006). Arts advocates contended the arts played an important role in public education because they enhanced skills and knowledge that transferred to student performance in other academic subjects, positively affected social and emotional learning, and improved artistic ability and creativity which were valuable skills in the economy (Deasy, 2002; Eisner, 2002;Winner et al., 2013; Winner & Hetland, 2001).

Former Secretary of Education, Arne Duncan stated:

> Low income students who had arts-rich experiences in high school were more than three times as likely to earn a B.A. as low-income students without those experiences. A new study from the National Endowment reports that low-income high school students who earned few or no arts credits were five times more likely not to graduate from high school than low-income students who earned many arts credits. (U.S. Department of Education, 2012, 1)

No Child Left Behind was initiated to increase student achievement across all economic levels regardless of ethnicity, gender, and income (U.S. Dept. of Education) . To meet adequate yearly progress (AYP), students must take standardized examinations measuring mastery in mathematics, reading, and science. The reduction in music education funding ensued and was due to an emphasis in core subjects (Beveridge, 2010). Music programs in public schools have been reduced or eliminated due to budget cuts, while protecting the core reading and math subjects.

The Elementary and Secondary Act (ESSA) of 2015 initiated by President Barack Obama was to ensure that ESSA incorporated music as a fundamental component and stipulated that

music should be included in the education of every child. The new Every Student Succeeds Act (ESSA) or Every Child Achieves Act *S.1177* passed in July 15, 2016. The act leveled the playing field for all students to have available music instruction according to NAfME. This legislation was a significant change from NCLB which focused heavily on the academic success of students narrowly defined as reading and math. ESSA mandated the following:

1. Music should be a part of every child's education, no matter their personal circumstance.
2. Schools would assess their ability to provide a well-rounded education including music by addressing any deficiencies using federal funds.
3. All Title I programs, both school-wide and targeted, should be available to provide supplemental funds for a well-rounded education including music.
4. Funds from Titles I, II and IV should support professional development for music educators as part of accompanying a well-rounded education.
5. States must include multiple progress measures in assessing school performance which could include music education-friendly measures as student engagement, parental engagement, and school culture/climate.
6. The new ESSA discouraged removing students from the classroom including music and arts for remedial instruction, (NAfME, 2015).

The following safeguards were put in place, but a deficit in program availability in music still existed. Three programs were examined in the literature review and other scholarly reviews on the benefits of music education programs and its effect on standardized achievement scores which included: (a) The Little Kids Rock program, (b) Turnaround Arts, and (c)Amp Up NYC. These programs demonstrate the potential to positively impact student achievement in reading and math.

Instrument availability is an essential component of any successful music program. These programs demonstrated the potential to positively impact student achievement in the areas of reading and math.

Instrument availability was an essential component of any successful music program. According to the National Association for Music Education (NafME), Texas schools faced a reduction in school funding (NAfME, 2011). Robert Floyd, director of the coalition for arts education stated, “If fine arts courses are singled out for budget cuts, we will be cutting the hearts out of the education system in Texas,” (TMEA, p.1, 2017).

Waller (2007) conducted research on music’s impact on academic achievement, attendance, and student behavior for the 2006 senior class from Virginia. Waller (2007) indicated students who received music instruction scored higher on the SAT in the verbal and math section of the exam compared to non-music students. This investigation used a causal comparative study of schools that did or did not have three types of Little Kids Rock Modern Band (LKRMB) programs to evaluate the variance in State of Texas Assessments of Academic Readiness (STAAR) mathematical score results. STAAR mathematics and demographic data for schools with LKRMB and traditional music (TM) schools came from Dallas ISD data packets.

In 1996, Dave Wish, founder of the LKRMB program, saw funding for music programs diminish. Mr. Wish created a program to combat the music education deficit for inner city youth. He felt compelled to offer music instruction in the after school program by teaching guitar. The program propagated, and the demand flourished with Little Kids Rock serving over 500,000 students in 45 states throughout the United States (Little Kids Rock, 2017). The LKRMB program filled the void in music education funding by providing instruments and modern band curriculum for school districts who witnessed funding cuts for the arts. Opportunities for students to take instrumental music lessons were typically available for more affluent school districts.

Waller’s previous research indicated that music has a positive effect on standardized tests. Waller conducted research on music’s impact on academic achievement, attendance, and

student conduct for a 2006 senior class from Virginia. His research indicated that students receiving music instruction scored higher on the Scholastic Aptitude Test (SAT) on the verbal and mathematics sections compared to non-music students. Overall, Waller's research indicated positive results given that music students achieved higher scores, better grade point averages (GPA), and lower absenteeism rates compared to non-music students (Waller, 2007). Boyd's (2013) music research project involved middle school academic performance in grades 6 through 8 and how music influenced standardized test results. Boyd's research indicated that music instruction positively affected math standardized testing outcomes especially when there was long-term involvement in music.

Quality instrumental programs such as the LKRMB program could improve STAAR mathematics' test scores. Two states that faced tremendous cuts in music funding were California and Pennsylvania. California experienced budgets cuts which affected music programs. From 1994 to 2004, California public schools experienced an increase in enrollment of 5.8%. Music course enrollment decreased at the rate of 50%, impacting a total of 512,366 students (Kratus, 2007) during a 5 year period. Urban schools experience a deficit in instrumental availability unlike their suburban counterparts (Doyle, 2012). Instrumental rental fees can be place a burden on families that have multiple children participating in music programs.

Considering that in 2010, Pittsburgh Public schools lost $27 million dollars, funding for music instruction was critically reduced. This budget decline did not provide much hope to improve music education. Arts education officer Angela Abadilla stated, "There's no doubt we've lost some time with students because of budgetary cuts." (Pittsburgh City Paper, p. 1) In 2011, there were 68 music teachers for the entire district. Additionally, these teachers were

responsible for servicing the Creative and Performing Arts High School (Nuttall, 2014).

Significance of the Study

According to Cavalier (2006), scientific research documented music's impact on school performance, SAT scores, increased spatial awareness, and a decrease in behavioral problems. The benefits for students participating in music education were significant. Students in music classes achieved scores of 50 to 100 points higher than students who were not enrolled in music (Everson & Milsap, 2015). Students with consistently high levels of involvement in instrumental music during the middle and high school years showed significantly higher levels of math proficiency by the 12th grade (Catterall et al., 1999). Students from lower socioeconomic status showed instrumental music's ability to bridge the gap between high-risk students (Catterall et al., 1999). P2

Rauscher et al. (1993, 1995) indicated that music could positively impact student achievement scores in mathematics. The "Mozart effect" was said to have a positive influence on intelligence quotient (IQ) and spatial reasoning after listening to a Mozart sonata for 10 minutes. Taylor and Rowe (2012) conducted research on The Mozart effect and how it connected to mathematics. Their research indicated that student's mathematics assessment scores increased while listening to Mozart. They noted that the findings by some researchers were controversial in that the effect was general intelligence improvement (Newman et al., 1995, Rauscher, 1999; Steele et al., 1997). Some research conducted on the Mozart effect did not produce the same outcomes.

A study conducted by Steele et al. (1999) did not indicate the same findings of the Mozart effect as did Rauscher and Shaw (1988). Their study focused on determining if a verbal distraction between a verbal pretest and a posttest developed when listening to a segment of the

Mozart sonata in D major. Research results indicated no substantial difference in performance on the pretest and no notable difference on the posttest performance. Conclusively, their study did not substantiate the findings of Rauscher and Shaw.

Problem Statement

This study was undertaken to determine the impact of music instruction using the LKRMB program on the 5th grade STAAR math achievement scores. The problem in this study was to determine (a) the effect of the Little Kids Rock program during and after school on fifth grade mathematics achievement; (b) the effect of LKRMB program duration over one, two, three, or more years on fifth graders mathematics achievement scores; (c) and the impact of other demographic variables on fifth grade students' mathematics achievement.

In 2001, Congress reauthorized the Elementary and Secondary Act (ESEA) and Title I. In addition, new requirements for elementary and secondary schools stipulated that students were to attain a proficiency level by 2013-2014 (Rose, 2004). If a school did not meet their adequate yearly progress (AYP) goals on exams measuring language arts, mathematics and science, the schools could face remedial measures.

This investigation was a causal-comparative study of three types LKRMB programs compared to traditional music (TM) programs to evaluate the variance in STAAR mathematical score results. STAAR data from the participating LKRMB and traditional music program schools derived from the Dallas ISD Data packets. These data packets contained pertinent demographic data that has been included in this study.

Purpose Statement

The purpose of this dissertation was to ascertain whether the LKRMB program could improve mathematics student achievement scores as related to STAAR. The research study

excluded private music, charter, and magnet schools. I eliminated schools with high SES because most of the schools serviced by the Little Kids Rock program were schools with low SES and budgets which impeded their ability to provide instruments such as guitars provided by the program. This study involved similar Dallas ISD schools demographically inclusive of similar socioeconomic skills, race/ethnicity, and gender. The schools had similar populations of special education students (SPED), limited English proficiency students (LEP), and at-risk students.

Standardized tests scores determined a school district's rating. According to the Texas Education Agency (TEA, 2015)) website for the upcoming school year, H. B 2804 utilized five domains to determine a school's rating. The five domains were: (a) Domain I: Student achievement, (b) Domain II: Student progress, (c) Domain III: Closing performance gaps, (d) Domain IV: Postsecondary readiness, and (e) Domain V: Student and community engagement.

The calculation of the first three domains equated to a combined score of 55%. The bill did not describe the system that determined calculations. Domain IV weighted as 35% and Domain V carried the weight of 10%. Schools received a letter grade ranging from A to F for each domain based on performance. The letter grades replaced the met standards or needs improvement ratings. These ratings received approval from Governor Greg Abbott for the 2016 school year. The met standards category on the STAAR test was the criteria to compare LKRMB and traditional music program schools.

Fitzpatrick (2004) stated that low socio-economic students compared to higher income students utilizing the Ohio Proficiency Test (OPT) showed improved results. The categories included: (a) students with high income and instrumental music, (b) students with high income and no music, (c) students with low income and instrumental music, and (d) students with low

income and no instrumental music. Results indicated that ninth grade low income students outperformed the high income and no music counterparts on the OPT exam (Price, 2010).

Miendlarzewska and Trost (2014) stated that musical training resulted in better achievement scores in domains other than music performance, such as verbal abilities, second language learning, non-verbal reasoning and general intelligence. In 2015, President Obama pledged $240 million dollars to science, technology, engineering, and math (STEM) in his Educate to Innovate initiative to increase studies in STEM education. The arts, however, did not receive funding (Czamecki, 2015). As an extension of past research conducted on the relationship between music and standardized tests, an investigation of the impact of the LKRMB on elementary students as measured by the STAAR exam scores occurred.

Research Questions

The following research questions guided this study:

1. What is the effect of participation in different types of LKRMB programs (during school, after-school, or during and after-school) versus traditional music instruction on fifth graders' mathematics achievement as measured by STAAR?
2. For LKRMB students, what is the effect of length of participation in LKRMB (1 year, 2 years, or 3 years) on these same fifth grade students' mathematics achievement scores as measured by STAAR ?
3. What is the effect of gender, race/ethnicity, SES, LEP, at-risk, type of music instruction on students' mathematical achievement as measured by the STAAR examination?

This research study analyzed the impact the Little Kids Rock program had on fifth grade mathematics STAAR achievement scores and the benefits this program could provide in all public schools. The quantitative research study comprised of fifth grade Little Kids Rock students in Dallas using STAAR mathematics data. There was a comparison made between LKRMB students and traditional music program students.

Background

According to preliminary results from Texas Education Agency (TEA), approximately three quarters of the Texas' fifth and eighth graders successfully passed the STAAR reading and mathematics tests, according to preliminary results. The results reflected passing rates for the spring 2016 administration of STAAR in March. Results indicated that 79% of fifth grade students passed the STAAR mathematics test on their first attempt. Under state law, Texas fifth and eighth students must pass the STAAR reading and mathematics tests to be promoted to the next grade. Students that do not pass these exams could retake the tests in mid-May and would have a third opportunity in June. State law requires students who do not pass these exams to be retained in their present grade unless a parent appeals the retention and a local, campus-based grade placement committee unanimously agrees to promote them.

Dallas ISD recently implemented the teacher excellence initiative (TEI). This program links student achievement scores to teacher evaluation and performance pay. Students wishing to participate in music after-school programs were periodically dissuaded by content teachers who had concerns regarding the student's classroom performance in their content area. To have a successful fine arts program and bridge the gap between inner-city and affluent districts, after-school music programs were effective in closing the disparity. Several elementary schools in the United States did not have the LKRMB programs which consists of acoustic, electric, bass guitars, keyboards, and kit drum instruction.

The LKRMB which was termed Modern Band program supplemented music programs by providing the students with a variety of instruments which were generally unavailable to students unless they received private instruction. Students could take LKRMB instruction during the day, after school, and in some instances, before school. The teacher chose instruments which

included guitars, keyboards, ukuleles, drum kits, p-bones (plastic trombones) microphones with stands, and sound systems for the LKRMB programs.

I examined these programs in the literature review and other scholarly reviews on the benefits of music education programs and its effect on standardized achievement scores. These programs showed the potential to positively impact student achievement in the areas of reading and math.

Little Kids Rock Modern Band program was founded in 2002. The goal of this nonprofit organization was to provide free music instruction to inner city students. Private music lessons were expensive and not readily available to inner city students. According to the LKRMB website, the mission and purpose of this program is committed to: (a) guaranteeing that all public school students could unlock their inner musician; (b) ensuring that all children should have the opportunity to unlock their inner music maker; continuing cuts in music and arts education meant that many students never had this opportunity; (c) donating free instruments like guitars, drums and keyboards; (d) teaching children to perform, improvise, and compose the popular music genres that students already know and love like rock, pop, hip hop, country, reggae and rhythm and blues; and (e) making learning music fun starting on the first day, and to foster the skills needed to think creatively, act with confidence, and connect with others.

These skills helped students establish rich, purposeful lives, act with confidence and connect with others-the skills that assist aspiring musicians establish rich, purposeful lives. Little Kids Rock empowered children to play on day one by learning chord shapes, rather than learning to initially read and write standard notation and learn music theory. The LKRMB program provided teacher training, a curriculum, local staff development opportunities, and a four day summer Modern Band Summit for teachers within the United States who wished to receive

additional training. Due to the Covid 19 virus, the Modern Band Summit occurred virtually for 2020. With each training teachers attend, they receive points. The network of Little Kids Rock teachers across the United States became powerful. The teachers connected through social media and shared videos, teaching techniques, resources, and instructional presentations created by the teacher. The Little Kids Rock curriculum, other resources, conference presentations, and song charts are available on the teacher link of the website.

According to the LKRMB website, this program quickly became the leading free music education program in the United States providing weekly lessons to over 400,000 inner city public school children, through the efforts of teachers volunteering nationwide. Teachers must apply to become a LKRMB instructor. The organization partnered with school districts for training public school teachers in the Modern Band curriculum. Their partners donated instruments to teach popular music in a way that empowered students to experience rapid achievement.

The relationship between music and mathematics intertwined. There is a significant connection between students participating in the arts and higher academic achievement indicated by scores on the Florida Comprehensive Assessment Test (FCAT) along with math and verbal portion on the SAT exam (Kelly, 2012). The aim of this research study was to determine if a correlation exists between students enrolled in the Little Kids Rock programs and academic achievement on the STAAR exam in Texas schools. LKRMB teachers received a survey asking them to provide information on their involvement in the program and their feelings on the impact they felt the program had on student achievement. The Texas Music Educators Association (TMEA) in conjunction with Texas Coalition for Quality Arts Education (TCQAE) (2010) gathered data which involved campus academic achievement ratings, campus rating

improvement, graduation rates, and fine arts enrollment from 2006 through 2010. Their study revealed campuses with higher fine arts enrollment realized higher academic ratings and campuses whose fine arts enrollments were higher additionally reported higher graduation rates.

Dallas ISD had a large LKRMB enrollment and conclusions from this data could support evidence that a significant relationship existed between music and academic achievement. Several studies provided substantiated evidence that a correlation existed between music instruction and math achievement scores.

Turnaround Arts (TA) was a public/private collaborative effort with former President Obama's Committee on the Arts and the Humanities, National Endowment for the Arts (NEA), local partners, and numerous private foundations. This program was not only to improve student achievement but to build bridges within the community through parental involvement. The TA program targeted low performing schools in 36 school districts and 15 states from the District of Columbia. According to the TA site, the program classified these schools as priority designated because of having the lowest 5% reporting in their district and receiving art education programs. The programs desiring involvement in this initiative submitted applications to become involved as a Turnaround Arts location. The partners received musical instruments, art supplies, licensing rights, and kits for school musicals. The partners received training, program methodologies, evaluations, training, and peer-to-peer learning. Peer training convinced teachers who had reservations about hosting the arts program in their classes in the implementation of the program. Teaching art for a non-fine arts teacher removed a content teacher from their comfort zone. However, teachers embraced the challenge and were successful with the infusion of art instruction in their classroom.

The results from TA programs from 2013 to 2014 in the targeted schools were

noteworthy. The evaluation team investigated math and reading proficiency rates. The team conducted an analysis of the percentage points gain a school made in reading and math and examined gains by percentages for the targeted school. A comparison between TA schools and school improvement grant schools (SIG) pertaining to data for reading and math revealed: (a) seven out of eight observed school increased their reading proficiency rates from 2011 to 2014; (b) six out of eight schools increased math proficiency rates between 2011 to 2014; (c) three schools had double digit point gains in math; two had similar growth in reading proficiency rates out of eight TA schools; (c) TA schools saw a 22.55% improvement in math between 2011 to 2014; and (d) TA schools showed 12.6% gains in reading proficiency.

Attendance and teacher perception factored into the report. They concluded that attendance increased because of student engagement in the arts. Surveys from teachers and researchers reported the TA had a positive impact on their schools and that expulsions were reduced by 70% at Martin Luther King School in Oregon. The response from the teacher survey indicated that more than 75 teachers and administrators agreed that arts instruction minimized the number of classroom disruptions, possibly because of student engagement. Burbank Elementary School in Hayward California was ranked 18 out of 18 schools in the area. After receiving the TA program, the school went from the lowest ranking of 18 to the number one ranked school in the district. The research reported that schools with low implementation of the program realized poor outcomes; schools with high participation in the program realized high academic scores, great attendance, and a reduction in discipline problems. The overall impact the TA program proved to be positive in the areas increasing math and reading achievement, decreasing discipline problems, improving attendance rates, and impacting teachers perceptions.

Thornton et al. (2007) published a report which compared music and non-music student's

advancement on the Pennsylvania System of School Assessment (PSSA). The basis of the research involved determining if there was a difference in students participating in music instruction versus nonparticipating students in music on the PSSA. The student participants enrolled participated in band, orchestra, choir, or district ensembles. Abeles (2007) discovered that Newark New Jersey elementary students enrolled in string classes from second through fourth grade outscored other students in the district on state exams at an accelerated rate. High school juniors enrolled in music class realized higher grade point averages (GPA) than students with no music instruction (Taetle, 1999).

Willis (2016) conducted research on music education's impact at the middle school level on mathematics scores on the Iowa assessments. His research using the Miendlarzweska and Trost model of musical instrumental training as the framework for a project entailed using middle school students' performance in math and music classes. Willis compared total math scores while controlling for socioeconomic status by comparing scores from 2012 through 2015. His initial findings were that there were no differences in baseline scores between groups of students who received no music instruction versus those who did receive music instruction but indicated that students involved in music realized higher math growth from 2013 to 2014.

Mallory (2012) conducted a study on music's effect on math and science standardized test scores. Mallory described two types of studies involving this theory. The first, involved how creating and listening to music enhanced mathematical reasoning. The other involved performing using musical instruments. From 1987 to 1998, verbal and math scores improved (Mallory, 2012).

An et al. (2015) recognized that Hispanic students were underrepresented in high school courses in STEM. The achievement gap was ever-present among the Hispanic and other ethnic

populations (Augustine et al., 2010; Singham, 2003;). Hispanic students were ill-prepared in mathematical studies necessary to compete in disciplines with high math concentrations. The researchers attempted to resolve this problem by incorporating math into physical education, dance, visual arts, drama and skateboarding. These attempts were unsuccessful, and implementation of a music-mathematics combined teaching approach occurred. Because of this adjustment, students' math scores grew.

An et al. (2015) determined that by conceptualizing mathematics and music composition, the natural connection between these two disciplines suggested that students should be provided additional opportunities to explore, understand, analyze, and interpret mathematics. While not much research in this area was available, the results of their study presented new perceptions about music and math incorporation.

Limitations of Study

The Texas Essential Knowledge and Skills (TEKS) for mathematics changed for the 2014 – 2015 school year. In instances where the trained LKRMB teacher transferred to another school district, the instruments remained as the property of Dallas ISD. The instruments could be transferred to another school within Dallas ISD. However, if a trained LKRMB transferred to the school, the instruments remained with the teacher. Other limitations unrelated to the LKRMB program involved students taking the STAAR Mathematics test. There could have been language barrier or a newly transferred student from another state whose curriculum was different from that of Texas' TEKS requirements. Depending on administration, some students were pulled from LKRMB to be tutored in preparation for the STAAR test.

Definition of Terms

- *Amp UP NYC* - An initiative that placed 600 Modern Band music programs in New York City public schools.
- *Every Student Succeeds Act (ESSA)* - This act mandated that all children receive music education.
- *Little Kids Rock Modern Band program (LKRMB)* - A non-profit organization dedicated to providing music and instruments to underserved communities across the United States.
- *Montessori method* - This method provided a self-directed approach to learning; not restrictive by age.
- *Music-mathematics integrated curriculum* - Combined math and music teaching. strategies for more engaging, creative methods of conveying mathematic and music concepts.
- *National Association for Music Education (NAfME)* - An organization dedicated to the preservation of music education.
- *No Child Left Behind Act (NCLB)* - A federal law provided funding for additional education assistance for underserved children to improve academic achievement.
- *Pre-University Learning System Experience (PULSE)* - A guided interactive online music lessons and materials for learning to play instruments with provided feedback.
- *Priority-designated schools* - Schools ranked in the low 5% of their districts.*Standardized Achievement Test (SAT)* - A standardized test used for college admissions.
- *State of Texas Assessments of Academic Readiness (STAAR)* - State mandated tests to assess student achievement in reading, math, and science.
- *Texas Education Agency (TEA)* - The agency that regulates public education in Texas.

- *Teacher Excellence Indices (TEI)* - A program implemented under former superintendent Mike Miles of Dallas ISD which ties teacher salary to student performance on standardized tests.
- *Traditional music (TM)* - Programs adopted by the school district which explored the elements of music.
- *Turnaround Arts (TA)* - A program initiated by Michelle Obama to raise achievement scores by providing rigorous arts programs in the low performing schools in the United States.

Conceptual Framework

Scientific research documented music's impact on school performance, SAT scores, increased spatial awareness, and a decrease in behavioral problems. The benefits for students participating in music education were significant. Constructivist theory views learning as an active process. One of the leading contributors of constructivism was Lev Vygotsky. Vygotsky concerned with experiences or processes that inspire student learning. The three constructs were social interaction, more knowledgeable other (MKO), and zone of proximal development (ZPD). Involving problem solving with and without assistance.

Organization of Study

The research consisted of a collection of fifth grade STAAR mathematics scores from 2014 to 2017 from Little Kids Rock students, general music students, and students with no music instruction. I employed a causal comparison research study on the differences between the following targeted populations in Texas by evaluating LKRMB students, general music students without LKRMB programs, and non-music students. LKRMB programs were currently found in the following local school districts: Arlington, DeSoto, Houston, San Antonio, Waxahachie, Irving, Grand Prairie, and Dallas. This investigation included only Dallas ISD schools. A

comparative analysis measured data from 2014 to 2017 to assess how LKRMB students performed on the mathematics portion of the STAAR exam. I used a compilation of STAAR data from LKRMB schools to examine the number of students continuously enrolled in the Little Kids Rock program and the frequency of the LKRMB instruction. Questions for clarification included: do the LKRMB students have LKRMB instruction during the day or in the after-school program? If they only met in the after-school program, how many times did they meet each week and for how many hours?

Chapter 2 contains literature reviews pertaining to music, standardized achievement results, and data assessments. The methodology section of Chapter 3 involved a causal comparative study using fifth grade students who were enrolled in LK RMB classes during school, afterschool, and during and after-school against general music students using STAAR math scores. This study covered three years of data from the data packets for each elementary school provided by Dallas ISD. The treatment group included LKRMB students and music students not enrolled in the LKRMB program. The study design, instruments used or developed, and the procedure for data collection and the expected type of data analysis will be provided.

Chapter 4 provides statistical data with an analysis of the findings. The results of the research either corroborate or disprove the research questions. The TEA website served as a resource for collecting STAAR data for north Texas school districts.

Chapter 5 includes the summary, conclusions, discussion, and recommendation based on the data. This section offers an overview of the study including linkages of the findings to prior research studies and literature reviews. The conclusion is comprised of differences and similarities in the control and experimental groupings of students involved in the research.

Chapter Summary

Compelling existing data and literature reviews supported that music instruction and mathematical academic achievement are related. The TA initiative clearly supported evidence that the arts impact on standardized test results could be significant. Data indicated that music students outperform other students on achievement tests. As the LKRMB program continued to proliferate, I sought to reaffirm the findings indicating significant growth in mathematics.

CHAPTER 2

REVIEW OF THE LITERATURE

The Texas Education Agency (TEA) required over 150,000 students elementary students in a large urban school district to have music, art, and physical education as part of their core curriculum on a weekly basis. The National Assessment of Educational Progress (NAEP, 2017), the largest survey of art education in the United States, indicated that only one-third of eighth grade students in the United States enrolled in art classes, and only 17% performed in school bands. This NAEP survey correlated similarly to enrollment data of secondary students in the aforementioned district.

Philosophy for Arts Integration in Schools

The arts integration philosophy is based on teaching and learning practices of what constitutes effective teaching in the classroom and what does not. Teachers explored various methods of how students learn based on educational research and learning theories. Each school developed a mission and a vision statement, which guided instruction. According to Cornett (2007), only after this preliminary work were stakeholders prepared to outline what they believed students needed most, what the school should do to meet the needs of students, and why the approach was used. Each school in Dallas ISD devised a campus improvement plan at the beginning of the year (Dallas ISD, 2018). Data compiled from S TA AR, (STAAR) provided reading, mathematics, and science scores. Based on these scores, decision makers devised a strategy to improve test scores in these areas, which included after-school tutoring twice a week and occasionally, Saturday school. The goal of each elementary school was to raise academic achievement scores incrementally each year. Through arts integration, achievement scores could potentially improve, resulting from an enriched fine arts program. Ludwig et al. (2017) provided

evidence to support arts integration. It was equally important to comprehend how music affects the brain.

Music and Brain Research

Music and brain research confirmed that engagement in the arts changed the brain (Berkowitz & Ansari, 2008). Further research indicated a significant correlation with academic performance which contributed to higher test scores (Mark, 2009). Music used the left and right hemispheres of the brain; activating cognitive, affective, psychomotor, visual, and auditory systems depends on "whether you are reading music, playing an instrument, composing a song, beating out a rhythm or just listening to a melody" (Wolfe, 2001, p.161).

A five year study conducted by the University of Southern California (USC) neuroscientists ascertained that music education advanced brain development in young children (Gersema, 2016). The Brain and Creativity Institute (BCI) began the research in 2012 in conjunction with the Los Angeles Philharmonic Association and the Heart of Los Angeles (HOLA).

Differing neural regions handled different facets of music. The analysis of music engaged numerous quasi-independent neural processes. Listening to music began with subcortical structures (including the cochlear nuclei, the brain stem, and cerebellum) which progressed to auditory cortices on both sides of the brain. Musical performance involved the frontal lobes and the motor and sensory cortex which provided feedback that one was performing with accuracy on your instrument (Levitin, 2006). According to Levitin, Musical activity involves all areas of the brain and nearly every neural subsystem. Different aspects of music are handled by different neural regions. The brain uses functional segregation for music processing and employs a system of feature detectors whose job it is to analyze

specific aspects of the musical signal, such as pitch, tempo, timbre, and other elements of music. Keeping a steady beat involves the cerebellum's timing circuits. Musical performance involves frontal lobes for planning your behavior as well as the motor cortex in the posterior part of the frontal lobe and the sensory cortex. Reading music involves the visual cortex in the occipital lobe. Listening or recalling lyrics involves the language centers, as well as other language centers in the temporal of frontal lobes.(Levitin, 85-86).

In 2004, the Dana Foundation, a private, charitable association whose interests include brain science, education, and immunology, sponsored the Dana Arts and Cognition Consortium. The consortium brought together scientists from seven research institutions whose purpose was to study how arts training in children could affect other learning domains. Their findings published in 2008 became the focus for a summit on neuroeducation, hosted by the John Hopkins Neuro-Education Initiative, in conjunction with the Dana Foundation.

In 2008, the consortium published its results in *Learning Arts, and the Brain: The Dana Consortium Report on Arts and Cognition*. Dr. Michael Gazzaniga, Consortium Director, offered this prologue: "Is it simply that smart people are drawn to 'do' art, to study and perform music, dance, drama-or does early arts training cause changes in the brain that enhance other important aspects of cognition?" (p.13).

Gazzaniga (2008) abridged eight key areas of interest that included:

1. An interest in a performing art leads to a high state of motivation that produces the sustained attention necessary to improve performance and the training of attention that leads to improvement in other domains of cognition.

2. Genetic studies have begun to yield candidate genes that may help explain individual differences in interest in the arts.

3. Specific links exist between high levels of music training and the ability to manipulate information in both working and long-term memory; these links extend beyond the domain of music training.

4. In children, there appear to be specific links between the practice of music and skills in geometrical representation, though not in other form of numerical representation.

5. Correlations exist between music training and both reading acquisition and sequence learning. One of the central predictors of early literacy, phonological awareness, is correlated with both music training and the development of a specific brain pathway.

6. Training in acting appears to lead to memory improvement through the learning of general skills for manipulating semantic information.

7. Adult self-reported interest in aesthetics is related to a temperamental factor of openness, which in turn is influences by dopamine-related genes.

8. Learning to dance by effective observation is closely related to learning by physical practice, both in the level of achievement and the neural substrates that support the organization of complex actions. Effective observational learning may transfer to other skills. (p.)

Winner and Hetland (2004) conducted a meta-analysis of 188 studies gathered from 1950 through 1999 concerning the causal effects of arts integration. After careful evaluation of sample size, experimental controls, and significance levels, the results indicated three areas with reliable causal links between the arts and academic achievement: (a) listening to music and spatial-temporal reasoning, (b)listening to play music and spatial reasoning, and (c) classroom drama and verbal skills.

Music and School Attendance

According to the NAfME (2015), schools with music programs had an attendance rate of 93.3% compared to 84.9% for schools without music programs. Seagoville High School of Dallas ISD realized improved attendance rates resulting from the Little Kids Rock program. Ken Molestina (2017), a local reporter from Dallas' CBS television station, interviewed Rodney Dittmar about his program. Mr. Dittmar was a Modern Band teacher and the regional director of Little Kids Rock for Dallas ISD. School officials reported in 2019, 87% of the senior class at Seagoville High graduated. Conversely, the graduation rate percentages for students in the music

programs was significantly higher at 96%. Mr. Dittmar stated, “It has definitely given students a drive to want to come to school” (Molestina, 2017, para. 3).

Arts Education and Integration in Teaching: Learning Theories

Learning theories are philosophical beliefs which informed arts integration and provided norms which clarify trends (Cornett, 2015). The theoretical basis necessary to justify arts education rested on its inclusion of social, psychomotor, cognitive, and affective domains. Arts education was also relevant to all content areas. Music, for example, was relevant to the sciences, social studies, mathematics, and language arts. According to Bamberger (2000), concepts common among music, mathematics, and science included hierarchies, units, ratio-proportion, symmetry, patterns, parts/wholes, same/different, and constant variables. Shared processes included inquiry, observation, experimentation, discovery, counting and measuring, parsing/chunking, classifying, and naming. These subjects included music instruction in these subjects, not in isolation, but daily. Mathematics was a continuous component of music because practice and performance constantly involved counting.

Constructivist theory saw learning as an active process. One of the leading contributors of constructivism was Lev Vygotsky. Vygotsky was concerned with experiences or processes that inspire student learning. His three constructs were: social interaction, more knowledgeable other (MKO), and zone of proximal development (ZPD) involving problem solving with and without assistance.

Social interaction played a key role in cognitive development. Language acquisition resulted from social interaction. Babies typically develop language acquisition from parents and others through imitating sounds made by adults and the environment. This theory was a component of Dave Wish’s philosophy of music as a second language.

The zone of proximal development encompassed distance between the learner's adeptness to complete an assignment with adult or peer partnership. The objective was for the student to be self-sufficient with the assignment completion. The student worked independently to solve the challenge. Social learning was a predecessor of learning. According to Vygotsky (1978), people used tools developed from culture, such as speech and writing, to mediate their social environments. Children, in turn, cultivated these tools serving only as social functions. Vygotsky believed that internalization of these tools influences superior thinking skills. As asserted by Vygotsky,

> Every function in the child's cultural development appears twice; first, on the social level, and secondly, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals. (p.57)

Vygotsky's (1978*)* collaborative learning model was a component of Vygotsky's constructivist theory. Vygotsky stated that learning occurred through exchanges with others. He ascertained that learning occurred as the teacher acted as the facilitator and assigned students a task to complete. It was the objective of the group to complete the assignment given to them.

Vygotsky's model was based on social collaboration; however, Gardner (1994) wrote that, "The biggest mistake of past centuries in teaching has been to treat all students as if they are variants of the same individual and thus to feel justified in teaching them all the same subjects the same way" (p.94).

Howard Gardner and the Theory of Multiple Intelligences

Gardner (2016) developed the theory of multiple intelligences which differentiated the ways in which children learn. The theory includes the following nine intelligences:

1. Linguistic: The ability to verbalize or write text.

2. Logical-Mathematical: Inductive and deductive reasoning aptitudes.
3. Visual-Spatial: One's ability to visualize mentally the objects and spatial proportions.
4. Body-Kinesthetic: The ability of the body to control physical movement.
5. Music-Rhythmic: The aptitude to master music and rhythms including beats and tones.
6. Interpersonal: Competency to effectively communicate with the public and develop associations.
7. Intrapersonal: The capacity to comprehend one's emotions, motivations, inner states of being and self-reflection. (Gardner, 2016)
8. Existentialism
9. Naturalist

The most used intelligences in the classroom were logical-mathematical and verbal-linguistic in the core content areas of education. Logical-mathematical intelligence is used in mathematics and science classes. Additionally, in the music classroom, counting rhythms and subdividing notes is a component of music. Language arts classes employed verbal-linguistic intelligence in all core content areas of education.

Music influenced social and intellectual impact on young children. Music increased the spatial, cognitive areas of the brain.

Gardner's (2011) musical-rhythmic intelligence theory addressed all learning styles of musicians. Gardner contended that all people had some capacity in all the intelligences. The criteria that Gardner specified for musical-rhythmic intelligence were as follows:

1. Shows sensitivity to patterns and regularities of rhythm, melody, and sound.
2. Learns best if concepts are sung or tapped out.

When students are learning a new song, the teacher usually plays the song for the students so that they hear the musical elements of that song. Students articulate the phrases of the song and clap phrases that present a challenge to students rhythmically.

3. May acquire information best with music in the background.

The method of study for some students involves listening to music. The genre of music depends on the preference of the listener.

4. Notice nonverbal sounds in the environment.

Non-verbal signals are used frequently in the classroom and in some staff development sessions. The presenter gives a non-verbal cue to the audience once the parameters have been established initially.

5. Plays an instrument.

One exception to this rule was a very talented student from Seagoville High School. Not only was he a talented guitarist; he played keyboards and drums equally as well. Mozart, a musical genius, developed the perfect or absolute pitch ability at an early age. He was able to discern when violins were a quarter out of tune by the age of 4 (Schonberg, 1970). Mariah Carey, a current pop singer, possesses this musical gift (Adams, 2006). One in 10,000 are born with this gift (Levitin, 2006). Without music training, they might lose it.

Gardner's (1993) theory of multiple intelligences addressed all possible learning styles of music students. If more teachers employed this methodology of instruction, it might be possible that achievement scores could be improved. In music instruction, some children are the auditory learners who have the capacity to go home and reproduce the melody as did Moweret, provided they have an instrument at their disposal. Visual learners recalled the notation on the page and can reproduce what they have seen on the musical page. Kinesthetic learners must be shown finger placement, and through cooperative learning, were able to feel successful as performers without feeling threatened due to dexterity or ability challenges.

Research on Music and Mathematics Achievement

Various studies conducted cited found positive outcomes resulting from music instruction on mathematics achievement scores (Boyd, 2013; Harris, 2007; Johnson, 2012; Thornton (2007); Turnaround Arts, 2012; Waller, 2007) and . Three studies indicated mixed results (Cranmore, 2014; Davenport, 2010; Willis, 2016). LaCour's (2010) research indicated no statistical differences between the group taking music and the group without music instruction.

Research Studies with Positive Results

One of the researchers yielding positive results was Thornton (2007). Thornton conducted research on schools with and without music instruction. The purpose of her research was to investigate music participation's effect on the Pennsylvania System of School Assessment (PSSA). Her participants were music and non-music students. The total number of participants was 6,984 with music participants totaling 4,983 and non-music participants totaling 2,001. Of the 187 schools contacted regarding the project, 36 districts responded; however, only 11 districts participated in the study. Music participants were students who participated in band, choir, and/or orchestra during school and extra-curricular activities such as show choir and marching band. The participants included students in the Pennsylvania public schools. Thornton divided the school groups by low, middle, and high socio-economic status. Thornton determined socioeconomic status by identifying those students who received free or reduced lunch.

Thornton used six statistical tests on the data including a two-tailed test, or a non-directional hypothesis, which assessed differences in two data groups: music and non-music students on 5^{th}, 8^{th}, and 11^{th} grade mathematics and reading scores. The findings indicated that music students achieved higher scores in reading and mathematics than non-music students. Differences were statistically significant at the $p<.001$ level. All observed differences in the

Thornton study were statistically significant at the $p \leq .001$ level. Challenges encountered by Thornton were low response rates, small sample sizes, and no participation by some Pennsylvania school districts.

Overall, the results from Thornton's (2007) research indicated that students participating in music at the fifth, eighth, and 11th grade levels scored higher than non-music students. Thornton remarked that these findings did not indicate that a cause and effect relationship existed. The study might have been a more effective with the original number of districts who were to have participated in the research study. The low participation rate of districts might have been even more problematic based on the low number of responses from teachers during the data collection. It is conceivable that the outcome of her project may have turned out much differently if the sample size and response rate had been larger.

Waller (2007) conducted research on music's impact on academic achievement, attendance, and student conduct for a 2006 senior class from Virginia and found that music students had lower absentee rates than non-music students based on his research. There were educators who did not value music and who felt that more attention should be directed to core subjects rather than music. The independent variables used for Waller's study were gender, ethnicity, and students enrolled in music versus students who were not enrolled in music. The dependent variables utilized were students' GPAs, academic achievement, attendance, referrals, and student conduct. Student behavior proved to be exceptional for students with music instruction.

The GPA results for music students was ($N = 2.82$) with a *SD* of .75. By contrast, the GPA results for non-music was students ($N=2.5505$) with a *SD* of .71. Waller's research revealed that students who received music instruction scored higher on the SAT in the verbal and math

sections compared to non-music students. Overall, Waller's research indicated positive results. Music students achieved higher scores than non-music students, better GPAs than non-music students, and had lower absenteeism rates compared to non-music students.

Harris' (2007) research involved students in Montessori schools receiving music enrichment classes versus. students who received regular Montessori instruction. Maria Montessori engrained music as part of her curriculum. Students' achievement scores in the Harris study were greater for students enrolled in music. Harris stated that Montessori has been shown to be a predictor of elevated achievement scores during high school in the areas of mathematics and science. Harris (2007) conducted a quantitative study showing music's relevance to academic achievement in the areas of how music affects brain function, music's influence on academic progression, the connectedness of music, math, and Montessori student academic development.

Harris (2007) stated her design was experimental by using a two-group post-test comparison. She sampled 200 Casa students from Ontario, Canada, ranging from 3 to 5 years of age. Students completed the three year Montessori curriculum, and gender division was somewhat uniform. The instructional day ranged from two and a half to three hours a day for nine months. Her findings showed that students receiving Montessori instruction achieved higher math scores when exposed to music curriculum. Harris' (2007) study was significant because of the implications for early music enrichment and its potential impact on academic achievement particularly in mathematics. Further research is needed to address more of a cause-effect relationship rather than a correlation.

Johnson (2016) conducted research designed to examine the effect that music participation had on school engagement and academic achievement in the Nashville Public

Schools. He used a regression model. His sample included a school district with 80,000 students speaking 135 native languages. The five variables he used in his study were as follows:

1. Student characteristics: gender, ethnicity, socioeconomic status
2. School or site characteristics: size, number of students on reduced lunch, ESL students
3. Music participation: student participation in band, choir, orchestra and number of participation semesters
4. Measures of school engagement: graduation rates, discipline problems, dropout rates
5. Academic gains: ACT test and student's grade point average (GPA)

Johnson measured student characteristics which included gender, ethnicity, and socioeconomic status. The school size, music participation, measures of student engagement, and academic gains were components included in his research.

Johnson (2016) commented that more high school SES inconsistencies were accounted for compared to everyone's SES inconsistency. Scores compiled from 2012 were compared to former scores generated in 2008. Student mobility factored into the 2008 data. His research indicated that student characteristics increased by one standard deviation (*SD*), and music participation increased by 0.66. He further determined that the relationship between student engagement and academic achievement had a regression estimate r =0.77. Johnson reported that the indirect effect calculated for music participation mediated by school engagement for academic achievement yielded an indirect effect of 0.29. Participation in music matched across disciplines, but in the areas of piano and guitar, there were minimal inconsistencies. This research conducted by Johnson (2016) provided insight into the influence music has on academic achievement. Johnson noted the probability that if student participation in music were higher, student engagement and academic achievement would increase.

Boyd's (2013) music research project involved middle school academic performance in

grades six through eight and how music influenced standardized test results. Boyd's research findings indicated that music instruction positively affected math standardized testing outcomes, especially when there was long-term involvement in music. The conclusions from this and other research studies should be considered when school districts are formulating budgets, especially in urban school districts. With quality music instruction, he found that standardized achievement scores would improve.

The Turnaround Arts program (TA, 2014) began as a partnership with the President's Committee on the Arts and Humanities program, resident partners, and numerous private benefactors. Former President Obama, First Lady Michelle Obama, and the Department of Education targeted schools they identified as "priority designated" or low-performing schools. These targeted schools had no music programs. The goal in the transformation of these schools was to supplement these targeted schools with music and arts programs.

TA's goal was to increase student achievement scores, community involvement, attendance, student engagement, and parental involvement. Potential partners to the TA program applied to become participants in the TA program. The program was a collaborative effort involving parents, local artists, school district members, and teachers. Teacher participants were able to learn from professional development. Specifically, TA program teachers participated in the Little Kids Rock Modern Band Summit during the summer of 2016, held in Fort Collins, Colorado.

Thirty-six school districts in 15 states participated in the TA program. The TA program involved 68 schools and 33,000 students. Demographics and gender were not reported in this study. Teachers received staff development training for implementation of the TA program.

The growth in mathematics and reading achievement scores was astounding, according to

the TA's (2014) website. The study was conducted from 2011 to 2014. The results were an overall 22.55% improvement in math proficiency and 12.62% improvement in reading proficiency. TA schools realized higher improvement rates in reading and math compared to regular school districts from 2011 to 2014. Math score gains for TA were 22.55%, compared to regular school gains of 20.13%. TA school gains in reading were 12.62%, compared to 7.92% in regular schools. The TA schools were also compared to the School Improvement Grant (SIG) campuses. Again, they surpassed School Improvement Grant schools. (SIG) campuses from 2011 to 2014 as detailed in the following paragraphs.

Mathematics and reading gains in TA versus. SIG schools indicated the following results: TA schools exhibited increases of 22.55% in mathematics. TA schools had 12.62% gains in reading. SIG schools realized 16.20% gains in mathematics and only 5.58% in reading. TA schools, compared to regular schools, indicated positive results regarding arts' infusion into the curriculum. TA schools scored 22.55% gains in mathematics and 12.62% gains in reading. The regular schools without TA curriculum scored 20.13% in mathematics and 7.92% in reading.

The data from TA (2015) supported the successes of the TA program. The 5% of the low-performing schools who initially did not have music programs showed significant improvement in the areas of math and reading. These schools ameliorated, or improved, community involvement and parental support. Student attendance improved in TA schools, and discipline problems declined. Teachers integrated arts into their curriculum.

The task of having non-music teachers integrate music into their curriculum was quite challenging. These teachers embraced the challenge and the program. Program implementation was a cohesive effort between non-arts teachers, music teachers, and art teachers. The results clearly indicated that music integration into a curriculum without music programs positively

impacted these participating schools academically in both reading and math. The fact that the TA schools performed better than the SIG and regular schools indicated a strong positive correlation between music curriculum and student academic achievement. Hayward Elementary in Burbank was a school whose ranking was 18th in the district. Hayward Elementary grew academically from being the 18th or lowest school to the number one school in the district. This result demonstrated the importance of music as a part of the curriculum.

Research Studies with Mixed Results

Based on the researchers' findings in the previous section, there was undeniable evidence that music improved academic achievement; however, results from Davenport (2010), Cranmore (2014) and Willis (2016) did not agree. Also, a negative result was reported from LaCour (2010). These mixed results and negative results provided a different analysis.

Davenport (2010) conducted research on how participation in music affected standardized tests scores and attendance in comparison to students without music instruction. His report did not include gender, socioeconomic status, or ethnicity as factors. His sample size consisted of three middle and three high schools from Baltimore, Maryland. The test data derived from the Maryland School Assessment (MSA) and Maryland High School Assessment (HSA). High school students with music participation yielded higher scores on the HSA in English and algebra. Attendance was higher as well. However, Davenport's analysis indicated that at the middle school level, there was no substantial difference in academic achievement between students enrolled in music classes and students who were not enrolled in music.

The middle school students' elementary music experience might be a factor as to why students did not perform well on standardized tests at the middle school level. It was not

mentioned as to whether the elementary schools had music programs. In some areas, the mobility rate of elementary schools could have been a contributing factor.

Cranmore (2014) conducted a qualitative study on students' perceptions about music and mathematics and the relationship between the two subjects. Cranmore compiled data from a student transcript examination document, a succession of interviews, and student self-reporting through a multiple intelligence assessment, i.e., MIDAS. Specifically, the purpose of his study was to explore high school students' perceptions of music and mathematics throughout high school and in their lives outside of school.

Cranmore's (2014) study involved 24 high school students. He used the Texas Assessment of Knowledge and Skills (TAKS) data and Multiple Intelligences Developmental Assessment Scales (MIDAS) to collect data. Cranmore divided the students into four groups. The two music groups had 24 students each. The two non-music groups equated to 18 students. The four groups were categorized as:

1. School music participation/commended mathematics (SMPCM). This group was made up of six students, three male, three female, three White, three Hispanic, two in band, two in choir, and two orchestra students.
2. School music participation/passing mathematics (SMPPM). The make-up of this group was six students, three male, three female, three White, three Hispanic, two in band, two in choir, and two orchestra students.
3. Non-school music participation/commended mathematics (NSMPCM). This group was comprised of six students, three male, three female, three White, and three Hispanic.
4. Non-school music participation /passing mathematics (NSMPPM). This group included six students, three male, three female, three White, and three Hispanic.

This grouping enabled Cranmore the opportunity to make comparisons, discover dissimilarities, and extract commonalities within each of the four groups. Student perceptions were essential in answering research queries. Comparisons between multiple groups led to the development of

theories relative to an innate understanding of how music and mathematical experiences might impact student lives.

In the study, Cranmore (2014) questioned students regarding their self-perceptions as musicians and mathematicians, their experiences in both subjects, their aspirations in both fields, and their views on the relationship between music and mathematics. Cranmore studied one north Texas high school with 2,000 students, using seniors from 2014 as the focus of his study. The demographics for this campus were about 56% Anglo, 25% Hispanic, 13% African-American, and 6% other. Cranmore gathered data using Exit Level Texas Assessment of Knowledge and Skills (TAKS) data tests. Specifically, Cranmore used mathematics scores from the Exit Level Altered TAKS exam (TAKS-ALT) from the 2012-2013 school year to measure mathematics achievement level. Students placed in the high mathematics group had to earn a commended score of 2400 or greater. Cranmore considered these students as high-level music participants. Students earning a score of 2400 but greater than the passing score of 2100 received a lower mathematics achievement classification.

Cranmore (2014) interviewed students about their perceptions regarding music and mathematics. The perceptions from the four groups were quite diverse. The interviews revealed the following opinions:

1. Student music perception/commended mathematics (SMPCM) – Five felt a connection between music and math; one felt unsure about the relationship between music and math.

2. Student music participation (SMPPM) – Four saw a connection with music and math; two saw no connection.

3. Non-school music participation/ commended mathematics (NSMPCM) – Two students felt a connection between music and math; four felt unsure about the connection.

4. Non-school music participation (NSMP/PM) – Three agreed that there was a connection; three disagreed.

Cranmore's (2014) qualitative study shed light on how students felt about the relationship between music and math. He admitted that sampling students from another high school might have generated a different result and that students' musical experience might have varied from students taking music in school and those who took private music instruction, since this district was one of the more affluent districts. He also acknowledged the research might have not reflected the entire student population. The instrumental music students in this study scored 90.62. The choral students score was 81.51. The non-music students scored 75.03. Although the correlations existed between math and music, the specific reason for the outcome could not be identified. Cranmore cited research conducted by Helmrich (2010). The differences in Cranmore's study and Helmrich was in the interpretation of their research findings. Helmrich's research on music's influence on algebra discovered that students enrolled in music exceeded students without music instruction.

In a separate study, Willis (2016) used music as a variable for sixth to eighth grade students. Willis mentioned that music education was not a component in all school curriculum. His research findings indicated mixed results as to whether music instruction had an impact on mathematics achievement scores. Willis conducted research on the impact of music education on mathematics achievement scores using the Iowa assessments for middle school students. In his analysis, Willis applied the Miendlarzweska and Trost model for music instruction. His research constituted a quantitative, causal-comparative study using students from grades six to eight from 2012 to 2015. Socioeconomic status was a component affecting student performance. His data included 116 students from schools in the northeastern United States. The school's curriculum included religion, math, science, social sciences, and language arts. Music education was available, but not a mandatory requisite for all schools. The school's music instruction

curriculum included coursework in choral music, band, orchestra, and music theory. Instruction was provided twice a week in 30 to 45minute increments.

Willis' (2016) data collection of 116 students was only available from 11 out of the 17 schools. The independent variable used involved students enrolled in music courses versus students without music instruction. Covariates used in this study were gender and socio-economic status (SES). The problem the Willis encountered in his research was that the sample size did not allow for generalizing the findings to the larger population. Additionally, the findings did not indicate growth using the Iowa assessment, although past research showed an impact or relationship on student achievement scores from schools who had music programs. Specifically, the results from a *t*-test indicated no difference in baseline scores among music students who received music class compared to students who did not receive music instruction. Baseline scores defined as measurements would be compared to future scores at some point..

Positive results from Willis' (2016) research indicated that music education was said to be a predictor regarding math progress using a regression model from 2013 to 2014. According to Willis, results of a regression model from 2013 to 2014 indicated that music education was a significant predictor of math growth scores (p =.015). Results of a regression model for 2014 to 2015 indicated that only socioeconomic status was a significant predictor of math growth scores (p = .039). Willis concluded that several forms of music education were related to improved academic performance when compared to students without music education. He stated improved academic results related to music education had been indicated to be a constant across socioeconomic households. Willis' study possibly offered a remedy for closing the achievement gap for low income students who were academically behind their peers regarding academic outcomes.

Research Studies and Theorists with No Difference in Groups

LaCour's (2010) research involved applying a quantitative causal-comparative study with students enrolled in music classes and students deprived of music instruction.
LaCour sought to discover a cause-effect relationship between music instruction and mathematics, reading, and science achievement as measured by TAKS scores. LaCour hypothesized that students enrolled in music would achieve higher scores on the TAKS test in reading, mathematics, and science when compared to non-music students. His null hypothesis, stated for conducting inferential statistical analyses, predicted that music students taking the TAKS test would not achieve higher scores in TAKS scores compared to non-music students in reading, mathematics, and science.

LaCour pointed to a study by Fehr (2007), in which students participating in elementary music programs produced higher scores on English and mathematics standardized tests than students without music instruction. In agreement with Petress (2005), he further asserted that music was an important subject of benefit to students, which should be taught within schools and not eliminated when financial complications are produced within the educational system. The sample size used by LaCour (2010) included 25 south Texas elementary schools with music programs and 25 schools without music programs. LaCour used TAKS data from 2008. The school data were selected based on location, curriculum, and student census data. His research concluded that there was no difference in the academic achievement of students taking music classes and students not enrolled in music classes.

LaCour (2010) used ANOVA for each component of his data analysis. The independent variable used in his four hypotheses was participation in the music program. For Hypothesis 1, he used TAKS data as his dependent variable. The *p* value for the first hypothesis was .485.

Hypothesis 2 used TAKS reading scores as the dependent variable. The findings for hypothesis 2 provided a *p* value of .2. Hypothesis 3 used TAKS science data as the dependent variable. The resulting *p* value was .415. Hypothesis 4 used TAKS mathematics data as the dependent variable. The resulting *p* value of hypothesis 4 was .228.

In summary, LaCour (2010) used an ANOVA to compare means of the two groups. LaCour used inferential statistics to the draw his conclusion that students taking music classes did not achieve higher scores on achievement tests than students not enrolled in music classes as indicated by the data below. He concluded that there were no statistically significant differences between groups.

Wish (2014) began his teaching career as a first grade English as a second language (ESL) teacher. He spent 10 years in the classroom. Wish stated,

> Since the founding of Little Kids Rock, the media has often noted that I developed the pedagogy that guides our teachers while working as a first-grade, ESL teacher. This is true. However, a more informative statement would be that I developed this new methodology precisely because I was an ESL teacher. (p.3)

He created a music as a second language methodology. The Little Kids Modern Band approach to music stated that music was, indeed, a second language. The language of music was spoken and written. Mr. Wish's teaching was influenced by Krashen's (1982) theories of second language acquisition; Krashen is one of the leading experts in language acquisition,

According to research conducted by Krashen (1982), most of his subjects could be placed in one of the following three categories: (a) motivation, (b) self-confidence, and (c) anxiety. Krashen (1982) proposed five main hypotheses:

1. The acquisition learning hypothesis. It states that adults have two distinct and independent methods of developing competence in a second language. This is how children develop language ability of their native language.

2. The monitor hypothesis. The function of learning is that of a monitor, or editor. Learning occurs when making a change in one's word, after it has been "produced" by the acquired system. This may occur prior to speaking or writing. (p.15).

3. The natural order hypothesis. Krashen states that grammatical structures proceed in a predictable sequence. He notes the order of acquisition of a second language is not the same as the order of acquisition of the native language, but similarities do exist.

4. The input hypothesis. This process targets how the learner acquires a second language. This is concerned with "acquisition"; not the "learning". (p.21)

5. The affective filter hypothesis. The affective filter states how affective factors relate to the second acquisition process.

As opposed to Krashn, Wish's teaching approach in music was devoid of music theory. Wish (2014) believed in the concept of approximation, in which students may feel comfortable and less anxious at their performance level. He ascertained from questioning his students their musical interests. He taught guitar chords from a success oriented approach. Perfection was not the objective as is with classical performance pedagogy. Wish received instrument donations to his program. Students' performing abilities on the guitar varied; students from all ability levels performed together. Students began composing melodies, improvising, creating their own rhythmic patterns. Wish claimed he approached teaching from the standpoint of teaching students to play music first instead of reading music notation. His rationale was that playing music was like speaking or having a conversation, the same approach used in language acquisition. Because of the tireless efforts of Wish, schools across the United States benefitted from musical programs that, because of budgetary deficits within school systems, they would not have had.

The benefits of the Little Kids Rock Modern Band program were that it:

1. Restored weekly music education classes to K-12 students in public schools that had been stripped of their music programs

2. Expanded music programs delivered to students by training teachers to offer classes utilizing Modern Band methods and materials.

3. Provided innovative teaching methods that were rooted in children's knowledge of popular music forms such as rock, pop, blues, country, hip-hop, reggae, and rhythm and blues.
4. Offered guitar, bass, keyboard, drums, vocals, technology and computers.
5. Offered music alternatives to current programs such as the marching band, orchestra, jazz band and choir.

The LKRMB program offered students the opportunity to learn to play instruments that were accessible to students in more affluent neighborhoods. Students from low socioeconomic areas were unable to take private lessons to study instruments available in the LKRMB program. Based on the literature review, the accrued academic benefits indicated that music might improve academic achievement in mathematics.

Chapter Summary

The review of literature provided differing evidence about how achievement scores, attendance rates, and graduation rates improved through the infusion of arts education. Conducting research using the LKRMB program and its relationship to academic achievement would provide a unique and focused method of improving standardized mathematics achievement results. While low performing schools in a large urban school district were in jeopardy of being taken over by the state due to low academic performance on the local level, the LKRMB program had the potential to improve academic achievement on standardized tests across the district.

CHAPTER 3

METHODOLOGY

The purpose of this study was to ascertain whether the LKRMB program enhanced fifth grade mathematics test results as they related to the STAAR. This design of the study facilitated my efforts to investigate the causal relationship between the independent variable (type of music program) and the dependent variable (mathematics achievement as measured by the STAAR mathematics exam). The overall research methodology employed for this study was causal-comparative. STAAR data were accessible from the TEA website, and the treatments were not manipulated because all instruction had already occurred.

The investigation compared Little Kids Rock students against traditional music program students. I sought to determine whether LKRMB students outscored traditional music program students on the STAAR mathematics exam. The outcomes from this study had the potential to impact music across the country through the implementation of the little Kids Rock curriculum.

Participants

I identified fifth grade student participants from all 157 Dallas ISD schools with elementary LKRMB programs and/or traditional music program programs. Student data included the number of students overall in the LKRMB and/or traditional music programs and the number of students in each LKRMB subgroup for schools participating in the study. The demographic data were on all schools. I excluded schools with high SES; the schools identified for this study were low in SES. More specifically, the selection of subjects included only fifth grade students in Dallas ISD from the following four pre-existing sub-groups: (a) students who received Little Kids Rock instruction during the instructional day, (b) students who received Little Kids Rock instruction in the after-school program, (c) students who received Little Kids Rock instruction

during the instructional day and in the after-school program, and (d) TM students who did not receive Little Kids Rock instruction. I compared LKRMB students traditional students; all students were from schools of similar demographics.

At the time of this study, school districts which had the LKRMB program in the North Central Texas area included Sherman, Arlington, Grand Prairie, and Dallas ISDs. Schools in Grand Prairie, Arlington, and DeSoto ISDs recently became LKRMB schools. The data utilized for this study included fifth grade students from Dallas ISD music programs and data from these same students when they were in third and fourth grade. Participants from all fifth grade music students enrolled in Dallas ISD during the 2017 - 2018 academic year, totaled 12,507 students who were included in the study.

Schools with high SES were eliminated because most of the schools serviced by the Little Kids Rock program were schools with low SES and budgets which impeded their ability to provide instruments, such as guitars, provided by the program. The $2,100 dollar cost for these guitars far exceeded the budget provided for by the school district. More affluent schools had resources to purchase instruments for their students.

The STAAR mathematics scores of LKRMB students from each of three LKRMB subgroups were compared students not enrolled in the LKRMB program. Dallas ISD schools were included because Dallas had a large LKRMB population. When I conducted this study, Dallas ISD had a total of 239 schools with 156 being elementary schools. One hundred eight elementary schools comprised the Little Kids Rock program students. Fifty-four elementary schools had traditional music program programs, which were also included in the study.

I limited analysis to the fifth grade targeted population. Fifth grade Dallas ISD demographics are indicated in a demographics table (See Table X).. The Dallas ISD gender

demographics from 2015 to 2017 in fifth grade are presented in Appendix A.

Instrumentation

The instruments used in this study included the STAAR mathematics test for third, fourth, and fifth grades. The STAAR mathematics data were collected from the years 2015 to 2016, 2016 to 2017, and 2017 to 2018 for all 2018 fifth graders participating in the study. According to the Texas Education Agency (TEA), STAAR was a series of state-mandated standardized tests used in Texas public primary and secondary schools to assess a student's achievement and knowledge learned at each grade level. The assessments are based on the Texas Essential Knowledge and Skills, which are the state curriculum standards. Beginning in grade three through high school graduation, students are tested in the core subject areas of reading, writing, mathematics, science ,and social studies (TEA, 2018). The scores reported from the STAAR test include raw scores and scale scores. The raw scores reported the number of questions answered correctly. Scale scores were deciphered across different sets of test questions. The STAAR 100-Point Scale allows for the comparison of a student's performance against the performance of other students who took the same STAAR exam (TEA, 2018).

The STAAR test is administered online or on paper answer sheets. Paper administration includes a test booklet in which students read test questions and place their answers on the answer sheets provided. In some instances, students need to be tested in a small group setting according to their individualized education program (IEP). This is applicable for students receiving special education services. These accommodations are available for students taking the STAAR and STAAR Spanish exams. Students have access to the following items: amplification and projection devices, dictionaries, basic transcribing, and individualized structured reminders. Braille was available for students who were visually impaired.

Extra time is allowed for students taking the STAAR exam if they meet one of the following criteria: (a) an ESL learner, (b) dyslexic, (c) autistic, (d) visually impaired, or (e) have reading complications which are a part of the student's IEP. Additionally, students can receive accommodations if the students require lengthy or frequent breaks because of a behavioral, emotional disabling, or medical conditions. In small group settings, dependent on the students' respective individual IEPs, the students might have the test questions read to them by the test administrator.

Reliability and Validity

With respect to test validity, the STAAR test is intended to measure a student's skills in reading, mathematics, writing, and science. It is also designed to assess a student's college and career readiness, beginning at the elementary school level. From the independent evaluation of the Validity and Reliability of STAAR grades three through eight Assessment Scores Part 1 report, TEA employs the Human Resources Research Organization (HumRRC) to provide an independent perspective to assess the validity and reliability of STAAR scores. According to the report, the independent evaluation is intended to support House Bill (HB) 743, which states that prior to an assessment being administered, "the assessment instrument must, on the basis of empirical evidence, be determined to be valid and reliable by an entity that is independent of the agency and of any other entity that developed the assessment instrument" (TEA, Student Assessment, 2018, p.1).

According to TEA, violation of security or confidentiality of any test required by the Texas Education Code (TEC), Chapter 39, Subchapter B is prohibited (TEA Student Assessment, 2018, p.1). All teachers are expected to be trained and sign a security oath prior to

the administration of the STAAR examination. Any deviation in the administration of the test is considered a violation.

Research Method/Design

The overall research method and design for this study was a quantitative, causal-comparative study using one-way ANOVAs for RQ1 and RQ2. I applied a quantitative correlational study using multiple regression analysis to RQ3. The instructional treatments were not manipulated; they already occurred. STAAR mathematics scores originated from the TEA website. The problem investigated by this study was to determine the effect of the LKRMB program on fifth grade students' mathematics achievement in third, fourth, and fifth grades as measured by STAAR. I gathered three years of test data from the TEA website and compared schools using the Little Kids Rock program in three subgroups: during school, after-school, and during and after-school to determine whether schools with Little Kids Rock program scored higher on the STAAR mathematics test than traditional music program students. The following three research questions guided the research method and design for this study.

1. What is the effect of participation in different types of LKRMB programs (during school, after-school, or during and after-school) versus traditional music instruction on fifth graders' mathematics achievement as measured by STAAR?

The treatment groups were the Little Kids Rock students and traditional music program students. The independent variable was type of music instruction. The dependent variable was mathematics achievement as measured by the STAAR test.

The research method for RQ1 was causal-comparative using a pre-experimental design in the form of a static group comparison. Each group, non-randomly formed, received a treatment and a post-test. The study was causal-comparative because the treatments had already occurred. I did not manipulate the treatment conditions. Comparisons were made between three LKRMB

experimental groups and one control group. The LKRMB students were recipients of the novel treatment (LKRMB instruction), whereas the traditional music program students were not. Differences in the three LKRMB experimental treatment conditions for RQ1 were in the length of LKRMB instruction and time of day. The three LKRMB experimental subgroups were categorized in the following manner: LKRMB after-school, LKRMB during school, LKRMB during and after-school. The single control group consisted of traditional non-LKRMB or traditional music program students. The posttest score used the final highest STAAR mathematics achievement score for each student. The study compared test results of LKRMB students to those of traditional music program students, who received no LKRMB instruction. (See Table 1 in Appendix section)

For RQ1, a pre-experimental design in the form of a static group comparison was used. It can be visually represented as follows:

- X1O
- X2O
- X3O
- X4O

2. For LKRMB students, what is the effect of length of participation in LKRMB (one year, two years, or three years) on these same fifth grade students' mathematics achievement scores as measured by STAAR ?

The treatment groups were the LKRMB students when they were in the third, fourth, and fifth grades. The independent variable was the grade level or the number of years of participation in the program. The dependent variable was mathematics achievement as measured by the STAAR.

For RQ2, the research method was again causal-comparative, with the instructional treatments already having occurred. The design for RQ2 was a modified time-series design or a

modified one group pretest posttest design. The LKRMB students (all three LKRMB sub-groups) received LKRMB instruction in third, fourth, and fifth grades and were retested at the end of third, fourth, and fifth grades.

I compared STAAR mathematics data from the 2015 - 2016, 2016 – 2017, and 2017 – 2018 school years to assess if scores of students enrolled in the Little Kids Rock program showed gains on STAAR mathematics test over time. For RQ2, a modified time series design or modified one-group pre-test-post-test design was used. This research design can be depicted as follows:

- XOXOXO

3. What is the effect of gender, race/ethnicity, SES, LEP, At-Risk, type of music instruction on students' mathematical achievement as measured by the STAAR examination?

RQ3 utilized correlational research methodology and constituted a multiple prediction study. This part of the study did not utilize an experimental design. Music instruction type was one of several independent factors/variables being investigated. It, along with various demographic variables, were the predictor variables in this part of the study. I used multiple regression to establish to what extent various demographic variables and other factors impacted or predicted score variability in mathematics achievement of fifth grade students. As stated previously, the independent factors/variables or predictor variables for consideration in this study were gender, race/ethnicity, SES status, LEP status, at-risk, and type of music instruction received (LKRMB or traditional music program instruction). The dependent or criterion variable was mathematics achievement as measured by the STAAR exam.

Background Information on Treatment Conditions

The feature that differentiated the LKRMB program in this study was that LKRMB students from traditional music program programs was that students received acoustic guitars after the teacher completed the initial LKRMB 101 training. LKRMB teachers participated in training throughout the year. Teachers could accumulate points based on the number of training hours acquired. Through the point system, the LKRMB teacher could acquire additional instruments and equipment, such as electric and bass guitars, pianos, drums, ukuleles, and microphones. For example, an electric bass was four points and an electric guitar was three points. The LKRMB department shipped these instruments directly to the LKRMB teacher's school. If the LKRMB teacher transferred to another school within the district, the LKRMB equipment and instruments transferred with the teacher.

TM classes were not supplied with LKRMB program instruments. Each Dallas ISD music teacher had a budget allotment of $200 dollars which could be spent on musical instruments at the teacher's discretion. TM instruction used Quaver Music and Silver-Burdett music curriculum. The general music teacher had the option of using both or either curriculum. The Dallas ISD school district adopted Quaver Music, a web-based curriculum . The curriculum consisted of singing, moving, and playing rhythm instruments. Teachers incorporated Music TEKS into the lessons. Instruments provided for the traditional music program curriculum consisted of Orff instruments, recorders, rhythm sticks, hand drums, congas, djembe drums bongos, and percussion instruments provided by the school district.

The LKRMB program filled in a deficit of the traditional music program instruction program by supplementing the program with additional instruments, which were unaffordable for most schools within current budgetary allotments. Again, the main difference in both the

LKRMB and traditional music program programs was in the availability of instruments and the curriculum provided by the LKRMB program. What differentiated the LKRMB curriculum from traditional music program curriculum was that students could take ownership in their musical preferred genres. An open-source database was provided for students and teachers to learn songs, instrumentation, with lyric links to learn songs.

Procedures

I designed the first and second parts of the research project to determine the effect of the Little Kids Rock program on STAAR mathematics achievement scores in fifth grade and over time (third, fourth, and fifth grade). I first used pre-existing data (i.e., fifth grade STAAR mathematic scores) to determine if LKRMB instruction had a positive effect on fifth graders' mathematics achievement as measured by the STAAR. Schools were selected based on similar SES. Then pre-existing data was used from the same fifth grade students in third through fifth grades from the years 2015 to 2016, 2016 to 2017, and 2017 to 2018. Schools with high SES were excluded from this study.

I collected fifth grade STAAR mathematics data for all fifth grade participants in 2017 to 2018 from the TEA website. STAAR mathematics data from third and fourth grades were collected for these same fifth graders. Students in fifth grade have three opportunities to pass the STAAR exam with the last attempt occurring in May. Some students receiving special education services with accommodations for STAAR testing and could have the STAAR test read to them depending on their individual education program (IEP). Bilingual students could take the STAAR exam in their native language. For each student, the highest score (from as many as three attempts) was used in the study. I did not include schools within Dallas ISD with high SES in this research so that the schools in the study would be similar academically.

For RQ1, the independent variable was the type of music instruction as represented by the four treatment groups: LKRMB during school, LKRMB after-school, LKRMB during and after-school, and traditional music program groups with no LKRMB instruction. Students receiving LKRMB instruction during the instructional day received a total of approximately 45 minutes of LKRMB instruction. Students receiving LKRMB instruction after-school received approximately one hour of additional instruction. Students receiving LKRMB instruction during school and in the after-school program received approximately one hour and 45 minutes of LKRMB instruction per week. The exact times for LKRMB after school students was contingent on when individual schools began their after-school programs. The traditional music program programs students met during the instructional day for approximately 45 minutes daily on a section rotation. In other words, the elementary music teacher did not see the same students every day. As described above, the differences in these four groups was in the type of music instruction that each group received and the length of instruction and time of day. I did not manipulate/control the treatment. Instruction had already occurred. I simply compiled and organized existing STAAR data for students included in this study.

For RQ2, I eliminated any students who did not attend Dallas ISD in the third and fourth grades. The data used were from the STAAR mathematics test from the years 2015 to 2016, 2016 to 2017, and 2017 to 2018. I did not manipulate or control the treatment conditions. As previously stated, the instruction had already occurred. I compiled and organized existing STAAR data.

According to Texas Music Educators' Association, teachers in Grades K through 12 public schools are required by law to provide instruction that covers 100% of the Texas Essential Knowledge and Skills (TEKS) applicable to each grade level. The TEKS assists in structuring

instruction around what students should know and be able to do at the end of each grade/level, not how that instruction should be delivered (TMEA, 2020). The LKRMB curriculum and traditional music program instruction was adaptable to these components in that the teacher had the flexibility to incorporate these essential skills into their lessons.

For RQ3, I collected demographic data on all participants, which included gender, race/ethnicity, SES, LEP, ESL, at-risk, and type of music instruction. I did not manipulate or control the treatments. Instruction had previously occurred. I organized and compiled the existing STAAR data according to gender, race/ethnicity, SES, LEP, ESL, at-risk, and type of music instruction. These were the independent or predictor variables. Math achievement as measured by STAAR was the dependent or criterion variable.

Data Analysis

For RQ1, I collected STAAR data from the TEA website. Means and standard deviations were reported for each group (LKRMB instruction during school, LKRMB instruction after school, LKRMB instruction during and after school, and traditional music program instruction). The difference between the mean scores of the three treatment groups and one control group were calculated using ANOVA at a probability level of $p \leq .05$ to determine statistical significance. For RQ2, STAAR data for the same students in third, fourth, and fifth grades was collected from the TEA website, and means and standard deviations for each grade level were calculated. I compared the means from the three grade levels using ANOVA and a probability level of $p \leq .05$ to determine statistical significance.

For RQ3, I performed a multiple regression analysis with a probability level of $p \leq .05$ to determine the extent to which various predictor or independent variables/factors affected the criterion or dependent variable of mathematics achievement as measured by the STAAR test.

These factors/variables included gender, race/ethnicity, SES, LEP status, and type of music instruction. I collected data from the Dallas ISD data packets and placed the results in Microsoft Excel and analyzed them using SPSS Version 26. This analysis permitted me to judge the impact of music instruction type and various external demographic factors not controlled for in the study.

Chapter Summary

The overall research method and design for this study was a quantitative, causal-comparative study using one-way ANOVAs for RQ1 and RQ2. I perfumed a multiple regression for RQ3. The instructional treatments were not manipulated I; they had already occurred. I compiled STAAR mathematics scores from the TEA website. The problem regarding this investigation was to determine the effect of the Little Kids Rock Modern Band program on fifth grade students' mathematics achievement in third, fourth, and fifth grades as measured by STAAR.

CHAPTER 4

FINDINGS

The purpose of this study was to determine whether the LKRMB program could improve mathematics student achievement scores as related to STAAR. For this study, my examination involved a comparative analysis of elementary schools teaching traditional music program curriculum. I excluded high SES schools in Dallas such as private, schools, magnet, and Montessori elementary schools. The variables used were comprised of 69 LKRMB elementary schools with similar demographics compared to 54 elementary schools with traditional music program programs.

The treatment groups were LKRMB and traditional music program students. The independent variable was the type of music instruction. The dependent variable was the STAAR exam. The following research questions were utilized to guide this study:

1. What is the effect of participation in different types of LKRMB programs (ding school, after-school, or during and after-school vs. traditional music program instruction on fifth graders' mathematics achievement as measured by STAAR.
2. For LKRMB students, what is the effect of length of participation in LKRMB (1 year, 2 years, or 3 years) on these same fifth grade students' mathematics achievement scores as measures by STAAR in 3rd, 4th, and 5th grades?
3. What is the effect of gender, race/ethnicity, SES, LEP, At-Risk students, and type of music instruction on students' mathematical achievement as measures by the STAAR examination?

Research Question 1

RQ1 was designed to measure the differences in students who participated in the LKRMB program during school, during and after school, and after school. It measured statistical differences in the STAAR mathematics scores based on their LKRMB participation versus. students enrolled in traditional music program programs (see Appendix B). The research method for RQ1was causal-comparative using a pre-experimental design in the form of a static group

comparison. Each group, nonrandomly formed, received a treatment and a posttest. The study was causal-comparative because the treatments had already occurred. Table 1 shows the result from these schools by code.

Table 1

Codes 1 – 4 LKRMB Schools

Code	Criterion	Total Schools
1	LKRMB program during the day	13
2	LKRMB program after school.	11
3	LKRMB program during & after school.	31
4	LKRMB program before, during, & after school	4
Total		69

Tables 2 and 3 display descriptive statistics for LKRMB. The range of Code 1 schools increased from 39 to 46.6. The total number of Code 1 schools was 13. The range of Code 2 schools increased from started at 53% but decreased in 2016 to 33%. In 2017 range increased to 52. The total number of Code 2 schools was 11. Code 2 and 3 schools ranged from 11 to 13. The Code 3 schools range increased from 45 to 58. Code 3 schools with LKRMB during and after schools had 31 schools which met standards. Code 3 schools yielded the highest gains. Code 4 schools had LKRMB instruction before, during, and after school. Code 4 schools in 2015 ranged from 30 with an increase to 38.2 in 2016. However, in 2017, the range scored decreased to 15.

The schools categorized in Code 4 only had four schools from years 2015 to 2017 that met standards in mathematics on the STAAR exam. Mean scores increased in Code schools 1, 2, and 3 incrementally from 2015 to 2017. Code 4 schools ranged from 25 to 29.5, a 4% gain.

The standard deviation in Code 1 schools remained almost the same and varied by one point from 12%. The standard deviation in Code 2 schools ranged from 16% in 2015, decreased

to 12.7% in 2016, and increased to 18% in 2017. Code 3 schools increased incrementally by 1 point. Code 4 schools ranged from 13%, increased to 16% in 2016, and decreased to 6% in 2017.

Table 2

LKRMB Descriptive Statistics: School Codes 1 – 4 by Year

School Code		*n*	Range	Min	Max	Mean	SD	Var
1	Y2015	13	39	10	49	28.18	12.107	146.58
	Y2016	13	42.3	9.7	52	33.55	11.73	137.68
	Y2017	13	46.6	21.5	68.1	41.48	12.66	160.17
2	Y2015	11	53	9	62	32.34	16.143	260.60
	Y2016	11	33.0	21	54.0	38.46	12.79	163.67
	Y2017	11	52.2	25.3	77.5	49.06	18.12	328.36
3	Y2015	31	45	4	49	28.83	12.08	145.97
	Y2016	31	56.1	11.8	67.9	35.8	13.87	192.25
	Y2017	31	58.2	14.0	72.2	41.47	14.79	218.85
4	Y2015	4	30	9	39	25.5	13.13	172.38
	Y2016	4	38.2	13.3	51.5	29.03	16.17	261.48
	Y2017	4	15.0	22.2	37.2	29.58	6.74	45.46

Valid N (listwise): School 1 = 13; School 2 = 11; School 3 = 31; School 4 = 4.

Table 3

LKRMB Campus: Group 1

	N	Range	Min	Max	Mean	*SD*	Var
2015	69	62.1	.00	62.1	28.32	12.03	144.75
2016	69	67.9	.00	67.9	34.62	13.56	183.92
2017	69	68.3	9.2	77.5	41.12	14.8	219.08

Valid N (listwise) = 69

The mean scores for Code 1 schools from 2015 to 2017 increased from year to year. In 2015, the mean score was 28.18. In 2016, the score increased to 33.5. In 2017, the mean again increased from 33.5 in the previous year to 41.4. The mean scores for Code 2 schools in 2015

increased from 32.3 in 2015 to 49 in 2017. The mean scores for Code 3 schools in 2015 increased from 28.8 to 41.4 in 2017. The mean scores for Code 4 schools increased slightly from 25.5 in 2015 to 29 in 2016. However, in 2017 the mean score only increased by .55.

The traditional school data research results from 2015 to 2017 are indicated in Table 4. Fifty-four traditional schools were reported in this investigation. The traditional school in 2015 ranged from 58.6 to 49 in 2016. The range increased in 2016 and 2017 from 49.3 to 58.2. Standard deviation in 2015 ranged from 11.1 to 12.8 in 2016. In 2017, the standard deviation increased to 13.9. There was an increase of 1% from the years 2015 to 2017 indicating incremental growth. The statistical mean increased gradually throughout all three years indicating growth. In 2015, the data showed 29% in 2015, 34% in 2016, to 42% in 2017. There was a 5% to 7% gain in the three year period. The standard deviation increased from 11% in 2015 to 14% in 2017, indicating a 3% growth overall from 2015 to 2017. The statistical variance range went from 124.5 to 194.5. The number of traditional schools (*N*=54) remained the same. The statistical range went from 58.60% in 2015 down to 48% in 2016. In 2017, there was a nine-point increase from 49 to 58. Table 4 indicates the results.

Table 4

Traditional Campus: Group 2

	N	Range	Min	Max	Mean	*SD*	Var
2015	54	58.60	8.1	66.7	29.37	11.16	124.6
2016	54	49.3	11.4	60.7	34.23	12.85	165.2
2017	54	58.2	11.8	70	41.9	13.95	194.55

Valid N (listwise) = 54

Research Question 2

RQ2 sought to answer the question: What is the effect of length of participation in

LKRMB (1 year, 2 years, or 3 years) on these same fifth grade students' mathematics achievement scores as measured by STAAR in third, fourth, and fifth grades? The treatment groups were the LKRMB students when they were in third, fourth, and fifth grades. The independent variable was the grade level or the number of years of participation in the program. The dependent variable was mathematics achievement as measured by STAAR. The type of analysis used in this study was an ANOVA which I conducted to compare the effect of the LKRMB program on mathematics scores as they related to STAAR from years 2015 to 2017. An analysis of variance showed that the effect of LKRMB programs was not significant, (F = 2, 65) =29.65, p=.000 (Table 5). An analysis of variance indicated that the effect of traditional music program programs was not significant, (F=2, 51) =25.5, p=.000 (Table 6).

Table 5

LKRMB Campus: Group 1 ANOVA Regression

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4626.62	2	2313.31	29.66	.000[c]
Residual	5071.54	65	78.02		
Total	9698.16	67			

Dependent Variable: Campus STAAR Math 2015. Predictors: (Constant), Campus STAAR Math 2016, Campus STAAR Math 2017

Table 6

Traditional Campus: Group 2 ANOVA Regression

	Sum of Squares	df	Mean Square	F	Sig.
Regression	3301.582	2	1650.791	25.496	.000[c]
Residual	3302.091	51	64.747		
Total	6603.673	53			

Dependent Variable: Campus STAAR Math 2015. Predictors: (Constant), Campus STAAR Math 2016, Campus STAAR Math 2017

I conducted the independent *t*-test to compare students from LKRMB and traditional music program programs from 2015 through 2017. The dependent variable was the STAAR mathematics scores. The independent variables were LKRMB and traditional music program programs. For LKRMB schools, *N*=69; for traditional music program schools, *N*=54. The Campus STAAR mathematic listed in Table 7.

The *t*-test results indicated that in 2015, there was no significant difference between the STAAR mathematics scores of LKRMB schools of Group 1, (*M* = 28.3, *SD* = 12) and traditional schools (Group 2) (*M* = 29.3, *SD* = 11.1). The *SD* difference was one point. In 2016, there was no significant difference between the STAAR mathematics scores of LKRMB schools of Group 1, (*M* = 34.6, SD=13.5) and Group 2 (*M* = 34.2, *SD* = 12.8). The SD between both groups was less than 1 point. In 2017, there was no significant difference between Group 1 (*M* = 41.1, *SD* = 14.8) and Group 2 (*M* = 41.9, *SD* = 15.9) The SD difference between groups was one point. The data results are indicated in Table 7.

Table 7

t-*Test: Group 1 (LKRMB) & Group 2 (Traditional)*

	Group	*n*	Mean	*SD*	Std. Error Mean
2015	1.00	69	28.32	12.031	1.46
	2.00	54	29.37	11.162	1.52
2016	1.00	69	34.62	13.56	1.65
	2.00	54	34.26	12.85	1.75
2017	1.00	69	41.18	14.8	1.8
	2.00	54	41.93	13.95	1.9

Research Question 3

RQ3 sought to answer the question: What is the effect of SES, race/ethnicity, gender, economically disadvantaged, LEP, at-risk, and type of music instruction on students'

mathematical achievement as measured by the STAAR examination? RQ3 was based on a correlational research methodology and constituted a multiple prediction study. This part of the study did not utilize an experimental design. Multiple regression was used to establish to what extent various demographic variables and other factors impacted or predicted score variability in mathematics achievement on these fifth grade students. Music instruction type was one of several independent factors/variables being investigated.

Socioeconomic Status

Socioeconomic status for LKRMB and traditional music program schools are homologous. Demographics for this investigation included schools with low SES. School demographics for both populations were comparable. This examination excluded all high SES elementary schools, magnet, and charter schools.

Race/Ethnicity

The mean score for the White population in 2015 was (M = 30, SD = 10.1). The mean score for the White population in 2016 was (M = 40.5, SD = 210) The mean score for the White population in 2017 was (M = 58.7, SD = 12.6). Mean scores in the White population saw an increase from 2015 through 2017. Standard deviation with same population in 2015 was 10.1. In 2016, the *SD* doubled but declined to 12.6 in 2017. Data for ethnicity is indicated in Table 8.

Table 8

Ethnicity Descriptive Statistics: White Population

	n	Min	Max	Mean	*SD*	Var
2015	5	16.7	41.7	30.10	10.16	103.24
2016	7		60	40.54	21.06	443.4
2017	4	46.2	72.2	58.78	12.63	159.39

Valid N (listwise) = 3

Results for the White population in 2015 using the one-sample *t*-test indicated a *t* value of 6.624 within 4 degrees of freedom and a significance level of .95. The mean difference of 30 is the difference between the sample average comparing the mean scores between the sample average. Results for the White population in 2016 using the same test indicated a *t* value of 5within 6 degrees of freedom and a significance level of .95. The mean difference of 40 is 10 points higher than the mean score in 2015 for the same population. In 2017, the White population using the same test indicated a *t* value of.58.7, with 3 degrees of freedom and a significance level of .95. The mean score of the White population indicated growth from 2015 – 2017. The mean scores grew from 30 to 58.7%.

Table 9

Ethnicity One-Sample Test: White Population

	t	df	Sig. (2-tailed)	Mean Difference	95% CI	
					Lower	Upper
2015	6.624	4	.003	30.1	17.48	42.72
2016	5.094	6	.002	40.54	21.07	60.02
2017	9.311	3	.003	58.78	38.69	78.86

Table 10

Ethnicity t-*Test One-Sample Statistics: White Population*

	n	Mean	*SD*	Std. Error Mean
2015	5	30.1	10.16	4.54
2016	7	40.54	21.06	7.96
2017	4	58.78	12.62	6.3

Results for the African-American population in 2015 using the one-sample *t*-test indicated a t value of 9.24 within 40 degrees of freedom and a significance level of .95. The

mean difference of 18.1 is the difference between the sample average comparing the mean scores between the sample average.

Table 11

Ethnicity Descriptive Statistics: African American Population

	n	Min	Max	Mean	*SD*	Var
2015	41	.00	60	18.10	12.55	157.37
2016	45	.00	56.5	20.04	12.73	162.08
2017	46	.00	57.1	26.56	12.2	148.85

Valid N (listwise) = 29

Table 12

Ethnicity One-Sample Test: African American Population

	t	df	Sig. (2-tailed)	Mean Difference	95% CI	
					Lower	Upper
2015	9.240	40	.000	18.1	14.14	22.06
2016	10.557	44	.000	20.04	16.21	23.86
2017	14.767	45	.000	26.56	22.94	30.19

Table 13

Ethnicity t-*Test One-Sample Statistics: African American Population*

	n	Mean	*SD*	Std. Error Mean
2015	41	18.1	12.55	1.96
2016	45	20.04	12.73	1.9
2017	46	26.56	12.2	1.8

When this study was conducted, the Hispanic population was the largest population in Dallas ISD schools. This population grew in terms of *t* mean scores in 2015 from 31.5 to 44.6.

Standard deviation scores increased in 2015 from 12.7 to 16.6. A growth of two points was realized each year.

Table 14

Ethnicity Descriptive Statistics: Hispanic Population

	n	Min	Max	Mean	*SD*	Var
2015	73	.0	78.6	31.51	12.83	164.7
2016	73	.0	74.4	38.53	14.6	200.47
2017	74	.0	81.6	44.63	16.62	276.09

Valid N (listwise) = 72

Table 15

Ethnicity One-Sample Test: Hispanic Population

	t	df	Sig. (2-tailed)	Mean Difference	95% CI	
					Lower	Upper
2015	20.98	72	.000	31.51	28.51	34.5
2016	23.25	72	.000	38.53	35.23	41.84
2017	23.12	73	.000	44.63	40.78	48.48

Table 16

Ethnicity t-*Test One-Sample Statistics: Hispanic Population*

	n	Mean	*SD*	Std. Error Mean
2015	73	31.51	12.83	1.5
2016	73	38.53	14.16	1.66
2017	74	44.63	16.62	1.93

Gender

Gender was compared from 2015 through 2017 using LKRMB and traditional music program schools to assess whether there was a difference in male versus. female mathematics

scores as they related to STAAR. The mean score for males with LKRMB instruction increased from 27 to 41%. The mean score among females grew from 29.9% to 42.2%. Both groups indicated growth. The standard deviation among males from 2015 through 2017 increased from 11.9 to 16.4%. Standard deviation among females grew from 13.1% to 15%. Growth among females increased by 1% each year while among males, an increase of 2 and 3% was shown. Males slightly outperformed females from 2015 through 2017.

Table 17

Gender Descriptive Statistics: LKRMB

	N	Min	Max	Sum	Mean	*SD*	Var
Male 2015	59	2.4	51.1	1865.2	27.032	11.93	142.21
Male 2016	59	8.8	72.2	2362.4	34.24	13.96	194.94
Male 2017	59	.00	8	2831.3	41.0	16.41	269.24
Female 2015	59	5.2	73.3	2067.6	29.97	13.15	172.85
Female 2016	59		65.2	2458.5	35.63	14.19	201.43
Female 2017	59	4.8	78	2917.1	42.28	15.03	225.88

Valid N (listwise) = 59

TM schools as it relates to gender indicated higher gains with the female population. The mean scores for males in 2015 ranged from 28.8% to 40.9% in 2017. Standard deviation for males was 13.1% in 2015. In 2016 and 2017 the standard deviation scores remained the same with a very slight difference of 12.128 to 14.13 in 2017. The female population had a mean score of 29.2 in 2015. Scores increased in 2016 to 33.9 to 43.3 in 2017. Whereas, the mean score for males grew by 4.1%, for females the mean score was significantly higher by 13.8 points. Standard deviation comparisons between traditional music program population of males and females indicated slightly higher scores in the female population. In 2015, the standard deviation for females was 11.9, in 2016 it was at 14%. In 2017, it increased by 1.2%. The standard

deviation for males in 2015 was 13.1. In 2016 and 2017 the score remained the same at 14.1%. The LKRMB and traditional music program students by comparison of mean and standard deviation did not show a significant difference between the two populations.

Table 18

Gender Descriptive Statistics: Traditional Music

	n	Range	Min	Max	Mean	*SD*	Var
Male 2015	54	68.4	.0	68.4	28.8	13.1	173.5
Male 2016	54	56.6	11.6	68.2	32.9	14.1	199.5
Male 2017	53	58.8	10	68.8	40.9	14.1	199.5
Female 2015	54	65.2	.263	65.5	29.2	11.9	141.9
Female 2016	54	61	8.7	69.7	33.9	14.4	209.3
Female 2017	52	61.3	11.1	72.4	43.3	15.2	231.4

Valid N (listwise) = 51

Economically Disadvantaged, LEP, and At-Risk

The LKRMB populations which included the subgroup categories of economically disadvantaged, LEP, and at-risk students showed improvement across all groups. The table indicating this growth is included in Table 19. The standard deviation and the mean scores are discussed in this section.

The LKRMB economically disadvantaged population in this study showed improvement on the mathematics portion of the STAAR exam. The mean score increased from 28.9% to 41.5% in 2015, 34.4% in 2016, to 41.5% in 2017; an overall improvement of 12.6%. The standard deviation in 2015 was 12.3%; 13.0% in 2016, and 14.3% in 2017. The standard deviation grew by 1% during this period.

The LEP population grew by 14.8% from 2015 - 2017. In 2015, the mean score was 31.1%; 37.8% in 2016, to 45.9%. The overall growth realized for this population was 14.8%. The

standard deviation in 2015 was 15.1% but dropped to 13.7% in 2016. However, in 2017, the score grew from 2% to 15.3%

The at-risk population showed growth on the STAAR exam. The investigation for at-risk students on the STAAR exam revealed an increase in mean scores by 12.7%. The mean score in 2015 was 23.8%. In 2016, an increase of 29.2% occurred showing 6% growth. In 2017, scores increased to 36.5%. Standard deviation in 2015 grew from 11.6% to 15.3%. To summarize, all populations in RQ3 realized gains from 2015 through 2017 on the STAAR mathematics examination. Table 19 presents the descriptive statistics for economically disadvantaged, limited English proficient, at-risk students.

Table 19

ED, LEP, and At-Risk Descriptive Statistics: LKRMB

	N	Min	Max	Mean	*SD*	Var
ED2015	74	.00	66.7	28.94	12.31	151.55
ED2016	73	1.10	71.1	34.47	13.062	170.61
ED2017	74	9.90	78.7	41.53	14.36	206.17
LEP2015	71	.00	83.3	31.16	15.11	228.38
LEP2016	69	13	71	37.87	13.72	188.17
LEP2017	72	9.70	82.8	45.93	16.38	268.18
AR2015	74	.00	50	23.81	11.65	135.64
AR2016	74	7.10	66.7	29.21	13.08	171.11
AR2017	73	6.70	76.8	36.55	15.38	236.43

Valid N (listwise) = 66

TM students were compared to the LKRMB population. High SES, magnet schools, charter schools were excluded to compare similar populations between both groups. Economically disadvantaged students from 2015 through 2017 mean data indicated an increase of 29.2 to 42.5%. The overall increase from 2015 through 2017 was 13 points. The standard

deviation from 2015 through 2017 increased by one point in subsequent years. The special education student subgroup population showed growth from 8.47% to 14.4%; an increase of 6 points. The Standard deviation in 2015 was 10.5% and increased to 15.6 in 2016. In 2016, the score decreased to 13.7%.

The LEP population for traditional music program students showed growth from 30.8 to 51.2%, an increase of 21%, which is significant. The standard deviation score increased during the same three year period from 13.7 to 37.2% with an increase of 24 points.

The at-risk population for traditional music program population mean score ranged from 13.7% to 37.2%. The standard deviation ranged from 11.6 to 14.

Table 20

ED, LEP, SPED, and At-Risk Descriptive Statistics: Traditional Music

	n	Range	Min	Max	Mean	*SD*	Var
ED2015	54	55.1	6.6	61.7	29.2	11.2	126.5
ED2016	54	48.8	10	58.8	33.8	12.5	158.4
ED2017	54	57.5	11.3	68.8	42.5	13.5	184.7
SPED2015	25	29	0	29	8.4	10.1	103.7
SPED2016	20	28.6	.00	28.6	9.02	10.5	111.4
SPED2017	25	70	.00	70.0	14.4	15.6	244.4
LEP2015	51	71.4	.00	71.4	30.8	13.7	188.9
LEP2016	51	66.7	.00	66.7	37.4	15.1	229.6
LEP2017	52	287	0	287	51.2	37.2	1386.7
AR2015	54	54.8	.0	54.8	23.0	11.6	136.3
AR2016	54	52.3	3.3	55.6	28.1	12.9	167.7
AR2017	54	60.7	1.8	62.5	35.4	14.0	197.8

Valid N (listwise) = 8

In all demographic variable populations examined, growth was realized on the STAAR mathematics examination for both LKRMB and traditional music program schools. In each

demographic population, the percentage of students realized growth.

Chapter Summary

RQ1 data support increased performance in all four code areas with variations between 2015 through 2017. RQ2 did not show significant differences between the various programs. RQ provided evidence of increases in performance in all the populations studied. These results did not provide evidence in better performance between students involve in the LKRMB program and traditional programs.

CHAPTER 5

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

When school districts face budget deficits, typically they alleviate the shortfall by eliminating music programs. As an extension of past research conducted on the relationship between music and standardized tests, I investigated the effect the LKMRB program has on elementary mathematics achievement as measured by the STAAR exam.

The purpose of this study was to examine the effect the LKRMB program has on fifth grade students STAAR achievement scores. To date, the Little Kids Rock program has not been a major focus or component of any research study. Nonprofit music programs, such as Little Kids Rock, have been paramount in providing music instruction to students who cannot afford private instrumental instruction and for schools whose music programs have been eliminated or have been reduced in scope. I examined whether the LKRMB program provides evidence that mathematics scores increase because of the program. The following questions guide this study.

1. What is the effect of participation in different types of LKRMB programs (during school, after-school, or during and after-school) versus traditional music instruction on fifth graders' mathematics achievement as measured by STAAR?
2. For LKRMB students, what is the effect of length of participation in LKRMB (one year, two years, or three years) on these same fifth grade students' mathematics achievement scores as measured by STAAR ?
3. What is the effect of gender, race/ethnicity, SES, LEP, At-Risk, type of music instruction on students' mathematical achievement as measured by the STAAR examination?

The results of this investigation revealed no significant differences between the LKRMB and traditional music programs. Comparing the participation in these programs showed no significant difference. Participation does not impact the relative scores. A comparison was made between all Dallas ISD elementary school fifth grade students from both populations. Low SES schools, male and female groups, LEP, special education, educationally disadvantaged, and at-

risk student subgroup populations indicated no significant difference in the mean scores from both school groups with similar populations. Both school populations showed academic growth on the STAAR exam. The comparison category for the evaluation was met standards on the STAAR exam. The mean in both school groups indicated academic growth on the STAAR mathematics exam in the met standards category for all populations.

The literature review included studies that yielded positive, neutral, and mixed results to get an overall perspective on the impact of music and test scores. LaCour's (2010) study was very similar to this investigation. LaCour (2010) applied a quantitative causal-comparative study with students in music classes and students without music instruction. LaCour used an ANOVA to compare means of the two groups. He used inferential statistics to the draw the conclusion that students taking music classes do not achieve higher scores on achievement tests than students not enrolled in music classes. LaCour concluded there were no statistically significant differences between groups. The difference between this study and LaCour's work is a general gain in scores across all groups. This overall gain may mask the impact of the music program.

Davenport (2010) conducted research on how participation in music affected standardized tests scores and attendance in comparison to students without music instruction. This study demonstrated mixed results. Davenport's sample size included three middle and three high schools from Baltimore, Maryland. The test data were based on the Maryland School Assessment (MSA) and Maryland High School Assessment (HSA). High school students with music participation yielded higher scores on the HSA in English and algebra. Middle school students showed no differences in scores among students who were and were not enrolled in music classes on the reading and mathematics portions of the test. No difference was shown in attendance or student achievement.

Further study may determine what caused academic growth in both groups. An investigation by comparing LKRMB reading STAAR scores against traditional schools at different grade levels can be a focus for future research. Gender specific schools in Dallas ISD are another area for future research to see if this impacts scores when music programs are initiated. Middle and high school level LKRMB schools can be compared to schools which offer band and orchestra to determine which population scores are higher on the standardized test, specifically, STAAR, ACT, PSAT, or SAT scores. These investigations not only can be conducted here in Dallas ISD incorporating other grade levels but at the national level since the LKRMB has grown and benefits other school districts by supplying instruments and curriculum across Texas and the United States.

It is interesting to note that scores improve during the study period but these changes cannot be related to this music program. Other external factors may account for these outcomes relating to the district leadership. In 2015, Dr. Michael Hinojosa returned to Dallas ISD after many teachers left the district and teacher morale was low. Realizing the state of the district, Dr. Hinojosa initiated new programs to improve teacher morale and school performance by offering financial incentives. The Teacher Excellence Initiative offers teachers higher pay based on teacher performance and student achievement on the STAAR exam. Additionally, teachers complete a climate survey about the school regarding discipline, administrative, and building facility questions. The principals receive the results of the survey each year. Other possible factors to impact student performance during this period include hiring bilingual teachers from overseas. Dallas ISD initiated a program to add more African American teachers to the classroom. Also, fifth grade scores increase in all populations examined.

Numerous research studies indicated that music education significantly improves academic test scores. The Little Kids Rock program has not been a component of any research study. Nonprofit music programs, such as Little Kids Rock, are becoming paramount to providing music instruction to students who cannot afford private instrumental instruction and schools whose music programs are being reduced. It is interesting to note that while there is no evidence that the music program impacted test scores, the programs do not hurt the performance as many teachers predict. It is important to find other benefits for these programs to support their continued use. According to the NAfME (2015), schools with music programs have an attendance rate of 93.3% compared to 84.9% for schools without music programs. One might surmise that if students have good attendance, they may do well academically.

APPENDIX A

SCHOOLS THAT OFFER LKRMP

Codes

1 = During school; 2 = After school; 3 = During & after; 4 = Before, during, & after school

Schools	Code	2015	2016	2017
Maria Moreno	1	17	20.3	32.2
Seagoville Elementary	1	23	29.1	21.5
Tom Field	1	43	32.7	31.8
Willian Cabell (Chapel Hill)	1	31	41.1	37.2
Anson Jones	1	37	48.9	56.1
Casa View	1	40	52.0	68.1
George Peabody	1	24	38.8	47.7
Henry B. Gonzalez	1	49	45.0	52.5
James Hogg	1	10	9.7	41.7
Jerry Junkins	1	22	31.8	28.9
Lenore K. Hall	1	19	26.7	47.1
Leonides Ciggaroa	1	15	26.8	34.4
T. G. Terry	1	37	33.3	40.0
Ronald McNair	2	9	21.0	32.7
Whitney Young	2	32	38.0	43.9
William Anderson	2	32	22.0	36.3
Winnetka	2	46	54.0	70.7
Anne Frank	2	46	42.0	38.6
Annie Webb Blanton	2	15	44.0	77.5
David Burnet	2	29	27.0	38.5
George H. W. Bush	2	24	41.0	41.1
George Truett	2	16	26.0	25.3
H. I. Holland at Lisbon	2	62	54.0	64.3
Harrell Budd	2	46	54.0	70.7
L.O. Donald	3	49	36.5	72.2
Martin Weiss	3	15	32.3	36.5
Nancy Moseley	3	38	33.6	64.4
Nathaniel Hawthorne	3	33	39.0	48.3
Obadiah Knight	3	45	52.1	54.9
Onesimo Hernandez	3	15	18.9	28.3
Pleasant Grove	3	25	22.7	34.2
Richard Lagow	3	49	52.5	46.4
Roger Q. Mills	3	12	39.6	42.9
Rufus Burleson	3	30	25.3	21.6
Leslie A. Stemmons	3	19	43.9	59.5

Schools	Code	2015	2016	2017
Stevens Park	3	26	27.2	19.1
Sudie Williams	3	25	39.3	48.8
Thelma Richardson	3	30	30.0	48.9
Tom C. Gooch	3	36	65.2	34.0
Urban Park	3	48	43.9	46.8
William B. Miller	3	31	37.5	44.2
Mary McLeod Bethune	3	48	43.9	46.8
C. F. Carr	3	22	13.0	14.0
Cedar Crest	3	21	18.5	39.7
Central	3	42	44.6	59.6
Clinton P. Russell	3	25	39.6	50.4
Gilbert Cuellar	3	34	67.9	41.7
Daniel Webster	3	10	17.6	22.1
Ebby Halliday	3	21	33.8	31.6
Edwin Kiest	3	24	33.0	34.8
Elisha M. Pease	3	4	11.8	22.5
Gabe Allen Charter	3	20	20.3	22.4
Herbert Marcus	3	29	36.7	32.8
J.T. Brashear	3	42	53.9	65.4
James Bowie	3	28	35.7	50.8
Margaret Henderson	4	39	51.5	32.9
Umphrey Lee	4	9	13.3	26.0
Barbara Jordan	4	33	23.5	37.2
Birdie Alexander	4	22	27.8	22.2

APPENDIX B

SCHOOLS THAT OFFER TRADITIONAL MUSIC PROGRAMS

Codes:

1 = During school; 2 = After school; 3 = During & after; 4 = Before, during, & after school

Schools	Org	Y2015	Y2016	Y2017	Code
Martin Luther King	128	8.1	11.8	11.8	1
John Neely Bryan	114	8.1	14.7	17.4	1
Edward Titche	216	11.6	11.4	17.4	1
Rice Learning Center	201	14.1	23.8	41.3	1
Thomas W. Marsalis	183	14.6	36.4	43.4	1
J.F. Kennedy Learning Ctr.	268	16.7	28.0	25.5	1
Adelle Turner	219	18.5	35.8	54.1	1
Nancy Cochran	236	19.1	24.3	45.1	1
Hotchkiss	159	19.5	18.2	19.3	1
Guzick	240	20.2	25.6	28.4	1
Jack Lowe Sr.	176	20.3	19.5	20.5	1
Cesar Chavez	281	20.3	34.1	38.1	1
Cedar Crest (A.S. Johnston)	163	21.3	18.5	39.7	1
Paul L. Dunbar	139	21.9	19.7	21.0	1
Clara Oliver	189	22.0	22.0	27.5	1
Rosemont	204	22.0	31.1	47.2	1
Julian. T. Saldivar	271	23.3	25.8	47.8	1
S. S. Conner	129	23.5	26.3	34.4	1
R.L. Thornton	215	24.6	25.4	36.0	1
W. A. Blair	109	24.7	32.9	51.2	1
John W. Carpenter	121	25.0	22.6	34.5	1
Stephen Foster	145	25.0	34.5	46.9	1
Julius Dorsey	137	25.6	47.9	54.9	1
Tolbert	277	26.4	36.2	36.4	1
Eladio Martinez	265	26.8	48.6	51.9	1
San Jacinto	207	27.0	30.8	35.6	1
John Peeler	192	27.8	41.5	23.4	1
Lorenzo DeZavala	260	28.6	16.7	31.3	1
J. J. Rhoads Learning Center	200	28.7	21.9	25.5	1
Larry Smith	154	28.7	35.4	41.5	1
Highland Meadows	284	29.4	33.3	36.4	1
W. W. Bushman	118	30.9	21.7	61.5	1
Bayles	108	31.1	23.2	32.5	1
Chapel Hill (Frm. Cabell)	119	31.3	41.1	37.2	1
Martha T. Reilly	198	31.9	47.1	63.3	1

Schools	Org	Y2015	Y2016	Y2017	Code
John Reagan	197	32.2	34.0	36.2	1
Ben Milam	184	33.3	41.0	47.8	1
Reinhardt	199	35.1	47.7	36.5	1
Leila Cowart	130	35.2	41.9	56.6	1
Arcadia Park	105	36.0	56.4	51.0	1
A. Callejo	247	36.6	34.0	34.8	1
F. P. Caillet	120	38.5	58.8	56.6	1
Dan D. Rogers	203	39.6	51.6	60.3	1
Nathan Adams	233	39.7	45.0	49.3	1
Alex Sanger	206	41.5	60.7	65.2	1
John Ireland	161	41.9	22.2	27.9	1
B. H. Macon	180	42.4	29.0	60.5	1
Arturo Salazar	239	43.0	46.8	56.6	1
Felix Botello	289	46.5	53.7	62.3	1
Jill Stone	141	48.8	54.5	48.8	1
Lee McShan	286	52.4	36.6	53.4	1
Walnut Hill	224	66.7	50.0	70.0	1

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