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The Effect of Year-Round Education on Middle School Student Achievement in Math: A Program Treatment within the Equity Project Charter School

Jason D. Skeeter

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The Effect of Year-Round Education on Middle School Student Achievement in Math: A Program Treatment within the Equity Project Charter School

Abstract

The purpose of this quantitative study was to compare the academic growth and proficiency in mathematics among a population of primarily low-socioeconomic students in a year-round school calendar at The Equity Project (TEP) charter school through comparison of year-round education student group and traditional education student group. Using a quasi-experimental design, an independent samples t-test and one sample t-test were used to compare the academic growth of the two student cohorts at TEP. Results for the fifth and sixth grade cohorts attending a year-round calendar supported a significant and positive impact using proficiency and growth as a measure of success; whereas results for the seventh and eighth grade cohorts attending under a year-round calendar were mixed. Overall, the results supported a significant difference between year-round education compared to traditional education when using proficiency and growth as a measure of success. The study brings awareness to the potential positive impact of calendar reform, particularly among low socioeconomic status students, reducing the achievement gap that has been evident throughout academic history. The recommendations for future research include: expanding the research to include different year-round school calendar public and private institutions, comparison of TEP and all traditional calendar schools within District 6, comparison of two schools that are aligned with the same state standards, a qualitative study to determine opinions and perceptions people have who are involved with calendar reform schools. The recommendation for practice is year-round calendar reform for institutions and districts that serve a high percentage of students from low-socioeconomic backgrounds.

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The Effect of Year-Round Education on Middle School Student Achievement in Math:
A Program Treatment within the Equity Project Charter School

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Submitted in partial fulfillment
of the requirements for the degree
Ed.D. in Executive Leadership

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Dedication

This dissertation is dedicated to my kids, Jaden and Jolie, who provided countless hours and uninterrupted support on this journey; and to Jessenia, my best friend and mother to our beautiful kids, whose support of and belief in me continue to be inspiring. I am hopeful this encourages you to someday embark on your own doctoral journey and pursue your intellectual passion. This dissertation is also dedicated to my mother, Patricia Skeeter; your willingness to create normalcy in my life when I was diagnosed with brain damage at 2 years old created all the confidence to believe I can achieve anything.

Dedication and warm thanks go to my dissertation committee: Dr. Robert C. Siebert, chair; and Dr. Adam L. Rockman, committee member. Your guidance, insight, patience, and perspectives were exactly what I was looking for in a doctoral program in which to grow. I consider myself so fortunate to have learned from you both. Your strengths were my areas of development and I hope with this completed dissertation that I honored your support and dedication to me.

Many thanks go to Zeke Vanderhoek and the TEP community, whose support in the process and open door policy allowed me the access to study a remarkable and thriving educational community. Thank you for allowing me the opportunity to explore calendar reform from the foundation and lens of TEP.

Gracious thanks to my friends and family who continued to check in on me throughout this process and provided support for my pursuit of a doctoral degree. Lastly, this dissertation is dedicated to SJFC Cohort 9 at the College of New Rochelle and

special dedication goes to Dr. Angela L. Rios of Team Evolve who led the way with a relentless shining light so I could be guided through. Cohort 9 has enriched my life and changed it in ways I never expected, but for which I am extremely grateful. Thank you and congratulations to us all!

Biographical Sketch

Jason D. Skeeter is currently a middle school math teacher at The Equity Project charter school. He holds his Bachelor of Science degree in Business Commerce and Finance from Niagara University, and his Master of Science degree in Elementary Education from The Relay Program in conjunction with Hunter College as well as a Masters in Educational Administration from Mercy College in School Building Leadership and School District Leadership. He has been committed to academic achievement in K-12 education positions for more than 15 years. Mr. Skeeter came to the Ed.D. program in Executive Leadership at St. John Fisher College in the summer of 2017 and pursued the study of calendar reform and student achievement under the direction of Dr. Robert C. Siebert, chair; and Dr. Adam L. Rockman. He received the Ed.D. in 2019.

Abstract

The purpose of this quantitative study was to compare the academic growth and proficiency in mathematics among a population of primarily low-socioeconomic students in a year-round school calendar at The Equity Project (TEP) charter school through comparison of year-round education student group and traditional education student group. Using a quasi-experimental design, an independent samples *t*-test and one sample *t*-test were used to compare the academic growth of the two student cohorts at TEP. Results for the fifth and sixth grade cohorts attending a year-round calendar supported a significant and positive impact using proficiency and growth as a measure of success; whereas results for the seventh and eighth grade cohorts attending under a year-round calendar were mixed. Overall, the results supported a significant difference between year-round education compared to traditional education when using proficiency and growth as a measure of success. The study brings awareness to the potential positive impact of calendar reform, particularly among low socioeconomic status students, reducing the achievement gap that has been evident throughout academic history. The recommendations for future research include: expanding the research to include different year-round school calendar public and private institutions, comparison of TEP and all traditional calendar schools within District 6, comparison of two schools that are aligned with the same state standards, a qualitative study to determine opinions and perceptions people have who are involved with calendar reform schools. The recommendation for

practice is year-round calendar reform for institutions and districts that serve a high percentage of students from low-socioeconomic backgrounds.

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Chapter 1: Introduction

This study examined the impact of year-round education on math achievement at The Equity Project (TEP) charter middle school. The Equity Project (TEP) charter school opened in September 2009 in the Washington Heights neighborhood of New York City. Originally, a fifth through eighth grade middle school, TEP now also serves students in kindergarten, first grade, and second grade and will soon be adding pre-kindergarten, third, and fourth grades, eventually becoming a pre-kindergarten through eighth grade school serving 1,200 students.

The majority of the population in the Washington Heights neighborhood is of Dominican birth or descent; this is also true of TEP's population. Currently, 93% of the middle school population is Hispanic, 5% is Black, and 2% is other (TEP, n.d.). TEP's current population represents a majority of students falling within a low-socioeconomic status, as defined by the free and reduced-cost school lunch program. This federally supported program provides free milk and free or reduced-cost meals to economically disadvantaged students whose families meet income eligibility guidelines (U.S. Department of Agriculture, Food and Nutrition Services, 2012). TEP's middle school currently has 475 students registered with the program with 406 receiving free lunch and 25 receiving reduced-cost lunch. Data shows that 90.7% of TEP's middle school population meet free and reduced-cost school lunch program standards (SIS, n.d.).

The hallmark of TEP charter school's unique approach to improving student outcomes is the concentration of resources on high quality teachers. The standard teacher

salary of \$125,000 plus an annual bonus of up to \$25,000 led the *New York Times* to label TEP one of the country's "most closely watched educational experiments" (Gootman, 2008, para. 8). The Equity Project believes that teacher quality is the most important factor in achieving educational equity. Spurred by this belief, TEP reallocates its public funds by making an unprecedented investment in attracting and retaining great teachers. In a CBS documentary, Katie Couric of *60 Minutes* described the school as "A bold new experiment in public education" (News, 2011). The Equity Project aims to prove that attracting the best and brightest teachers and holding them accountable to results is the essential ingredient to a school's success (Gootman, 2008). TEP's unique educational model served as the context and framework for this study.

High quality, well paid teachers is not the only reform pursued by TEP. To ensure that TEP is doing all it can to maximize student achievement, the model includes significant modifications to the school calendar, specifically, a single-track, year-round schooling model. This study was designed to address the impact of this year-round schooling model on student achievement in math. Because year-round schooling was implemented 4 years after the opening of TEP, this researcher had the opportunity to compare the standardized test scores in mathematics of students who attended TEP for 4 years with a traditional school calendar to students who attended TEP for 4 years with a year-round school calendar.

In 2013, TEP transitioned to a year-round school model. The notion of year-round school education is not new to this country. A few public school districts have used this method as early as 1904 to meet the needs of students (Fischel, 2003). There are differing ways to schedule the days of attendance in year-round schools. Although there are many

ways to implement a year-round school calendar, most students in year-round schools attend school the same number of days as students in schools that are on traditional school calendars.

Different year-round school models reflect different interests and needs of a particular school and district. Some schools chose year-round education due to overcrowding. Others have sought to combat summer learning loss, or ease school facilities. Schools have implemented year-round education by using either a single-track model or a multi-track model. A single-track model eliminates the traditional extended summer break and redistributes school days throughout the entire year; short intermissions are implemented, allowing time for remediation and enrichment (Johnson & Spradlin, 2007). A multi-track model is used to alleviate overcrowding in districts with constrained school facilities. Teachers and students are grouped into tracks and assigned different school schedules (Johnson & Spradlin, 2007). Theoretically, a building that can accommodate 750 students at a time will be able to support 1,000 students using the multi-track model, allowing 250 students to be on break each trimester. TEP currently utilizes a single-track year-round school model.

Regardless of the motive for implementing year-round education, calendar reconstruction is an educational reform primarily designed to improve student achievement. It is based on memory and time on task theories and how they are impacted by the patterns and pacing of schooling and non-schooling. The spacing effect phenomenon is grounded in early learning theory, whereby retention is greater when studying is given spaced presentations, as opposed to studying the same amount of

content in mass presentations. Spacing effect focuses on how time can be used to enhance long-term information retention (Karpicke & Bauernschmidt, 2011).

The first study of spacing effect was conducted by a German psychologist, Hermann Ebbinghaus, in 1878. Spacing effect says information retention can be increased if the information is learned over a longer period of time as opposed to learning that same amount of information in a shorter period of time. Therefore, according to spacing effect, students' ability to increase recall can simply be a shift in how information is delivered relative to time intervals. Utilizing the spacing effect framework, in a limited but very controlled environment, this researcher attempted to show the relationship between a traditional school calendar and a year-round school calendar and the effects each has on learning recall in math. For the purposes of this study, this researcher considered a traditional school calendar as the equivalent of mass presentation and a year-round school calendar as the equivalent of spaced presentations.

If research supports that information is retained most effectively when it is presented more than once in learning events that are distributed across extended periods of time, then educational researchers and reformers have strong theoretical footing on which to investigate and implement 12-month school calendars and schedules. Adopting a modified 12-month school calendar provides educators with distributed learning intervals required for the spacing effect, which has been shown to increase the rate of students' information retention (Roediger, Agarwal, Kang, & Marsh, 2010).

Kneese (1996) preformed a meta-analysis of the impact of year-round education on student academic performance. The results suggested that year-round education has small, but positive, effects on student achievement. However, limitations to the research

studies included in the meta-analysis included small sample sizes, differing research designs, and differing demographic characteristics of comparison groups (Kneese, 1996). Overall, the literature revealed findings that encouraged the use of year-round education, which is further explored and discussed in Chapter 2.

Building on prior research, this study examined The Equity Project charter school to determine whether a modified year-round calendar improved student information retention and achievement. As stated earlier, TEP is a middle school in a major urban setting in New York City; for the first 4 years, the school used a traditional school calendar, and then transitioned to a year-round school calendar. Having made this transition while maintaining the same math curriculum and assessments gives the researcher the ability to determine, in a relatively controlled setting, the impact of year-round education on student's ability to retain information specifically on state assessments in math.

Public schools in the United States are failing to meet the educational needs of students with disadvantaged backgrounds (Layton, 2015). One contributing factor to this failure may be that students from low-socioeconomic backgrounds typically start each school year on the same academic level achieved during the spring of their previous school year. Students from more affluent backgrounds typically start each school year on a higher academic level than was achieved at the conclusion of the previous school year (Alexander, Entwisle, & Olson, 2007). The difference in academic level the following school year indicates that students from higher socioeconomic backgrounds are learning or engaging in significant academic enrichment during the summer months. Conversely,

students with low-socioeconomic backgrounds are gaining substantially less academic knowledge or enrichment during the summer months (Alexander et al., 2007).

As stated earlier, TEP serves a student population that consists of more than 90% Title I students eligible to receive free or reduced lunch. It is important to investigate the possibility that a reorganization of the traditional school calendar to a year-round calendar could have a positive effect on summer learning loss experienced by students from low-socioeconomic backgrounds. Adding to the body of research on this topic is important because economically disadvantaged students continue to underperform despite efforts to address their educational needs during the traditional school year (Alexander et al., 2007).

Problem Statement

Researchers have identified a loss of learned knowledge and diminished retention and recall of instructional material in students who experience an extended summer vacation period as part of a traditional school calendar (Cooper, Nye, Charlton, Lindsay & Greathouse, 1996). Literature related to summer learning loss has indicated that students of low-socioeconomic status are more likely to be impacted by time away from school than their economically advantaged peers (Evans, 2007). Research suggests that attending year-round schools could potentially reduce the negative affect of summer learning loss on students from low-socioeconomic backgrounds who commonly experience little or no academic growth during the summer months. Given the bulk of the research on this topic, one must ask why year-round education is not being implemented in more schools, particularly schools with large socioeconomically disadvantaged children.

Perhaps we need more evidence of the efficacy of this model, particularly at the middle school level, and specifically in math, a subject that may serve as a gatekeeper to post-secondary success (Hein, Smerdon and Sambolt, 2013). With this study, the researcher hoped to provide such evidence.

Data from New York State math assessments were analyzed to determine whether students who attended TEP charter middle school during a time when the school was utilizing a year-round calendar achieved more significant growth in math than students who attended TEP charter middle school during a time when the school followed a traditional school calendar. Demographics of the TEP student body over the associated 8 school year time period remained relatively constant, as did the instructional and curriculum program. Although staff turnover did occur during the study period, some teachers were present through all or part of the two calendar transition period. Finally, the relative consistency of these variables added to the study's significance.

Purpose and Significance

The purpose of this retrospective study was to compare the effect of year-round education on student achievement in math at TEP charter middle school and to help educators understand the impact of a single-track, year-round school model on student information retention. The study also attempted to fill a void in the research, specifically in the area of middle school math achievement and growth as a measure of success when identifying calendar reform as an intervention for students of low socioeconomic background.

The approach used to study the effects of year-round education was to compare TEP student achievement in the form of math state assessment data during the first 4

years with a traditional school calendar versus the subsequent 4 years in a single-track year-round school calendar model.

This study and the associated results are significant for any school or school district that is considering whether year-round education will improve student outcomes and educational opportunities. This study is also significant for administrators who are considering school calendar reform in an effort to improve the academic success of students from low socioeconomic backgrounds, and thereby help to close the achievement gap. These results are also significant for those schools and districts that have been utilizing a year-round calendar, as questions continue to be raised regarding the efficacy of such a costly and sometimes controversial school reform.

Theoretical Rationale

The theoretical rationale for this study was based on the work of German psychologist, Hermann Ebbinghaus. In 1878, Ebbinghaus conducted the first study of the spacing effect theory using himself as his first subject and gathering data on his ability to recall nonsense syllables using short term and spaced learning patterns (Ebbinghaus, Ruger, & Bussenius, 1964). From the results of his seminal experiment, Ebbinghaus found that for a single 12 syllable series, 68 immediately successive repetitions had the effect of making possible an errorless recital after seven additional repetitions the following day. However, the same effect was achieved after only 38 distributed repetitions spread over 3 days (Ebbinghaus et al., 1964). Ebbinghaus also studied the concept of memory, publishing his initial research findings in 1885. Ebbinghaus surmised that spaced learning trials improved retention compared to learning trials packed closely

together. Ebbinghaus's ground breaking work spurred a number of studies on the spacing effect in the early 20th century (Dempster, 1989).

The research by Ebbinghaus supported that long-term recall was improved when the syllables were studied several times across extended periods, rather than continuously over a short period of time. These same findings also uncovered the existence of a *forgetting curve*. A forgetting curve is a pattern of forgetting recently acquired knowledge (Ebbinghaus et al., 1964). Ebbinghaus et al. (1964) found that a great deal of information is forgotten within 20 minutes of learning and two-thirds of that information is forgotten within one day. However, if the information is retained for more than one day, then the knowledge is transferred to long-term memory (Ebbinghaus et al., 1964). Following the seminal work of Ebbinghaus, much of the space learning effect research focused on strategies for overcoming the forgetting curve (Karpicke & Bauernschmidt, 2011; Miles, 2010; Son & Simon, 2012). Research has shown that allowing time, or space, between learning events is likely to result in better long-term information retention than through repeated intense studying over a short period of time (Carpenter, Cepeda, Rohrer, Kang, & Pashler, 2012).

There are two main aspects of early learning theory: changes in resistance to forgetting and changes in lag time between a question and an answer (Estes, 1955). According to Estes (1955), both aspects of preventing forgetfulness and reflex response are in line with Skinner's (1938) work on the use of reinforcement schedules that increase or decrease the likelihood of provoking a specific behavior. Through a series of probability curves, Estes quantified both aspects of early learning theory, labeled *habit strength*, a function of pattern reinforcement, and *response strength*, the effect of

conditioned stimulus intensity. Estes used this approach to find that the number and spacing of conditioning occurrences is related to habit strength. Forgetting can be manipulated by changing the number of learning occasions and the amount of time between learning occasions. Increasing the time interval between conditioning occurrences results in greater retention. Response strength appears greater with very short intervals between conditioning occurrences at first, but over time, spaced conditioning occurrences tend to produce faster recall (Estes, 1955). The researcher suggested that habit strength may have a correlation with year-round education particularly around pattern reinforcement. Changing the pattern of when instruction is delivered may increase memory retention. Creating spaced conditioning over time suggests that response recall will be produced. This early learning theory was tested on TEP's math data to determine if a change from a traditional school calendar to year-round school calendar has an impact on student achievement.

Research Questions

RQ1. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ2. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ3. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ4. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ5. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ6. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ7. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ8. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth

grade students attending TEP under a year-round calendar, when using growth as a measure of success?

Definitions of Terms

The following terms are used throughout this study:

Common Core State Standards Initiative (CCSSI) – A set of standards that provide a consistent, clear understanding of what students are expected to learn, so teachers and parents understand how to support them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our scholars need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010).

Free or reduced-cost school lunch program – The federally supported National School Lunch Program that provides free milk and free or reduced cost meals to economically disadvantaged students whose families meet income eligibility guidelines (U.S. Department of Agriculture, Food and Nutrition Services, 2012).

Instructional days – While state requirements vary on the minimum number of instructional days and/or hours in the school year, the majority of states require 180 days of student instruction (Mikulecky, 2013).

Low-socioeconomic status – Lower socioeconomic status students are those students who do qualify for the federal free and reduced lunch program (U.S. Department of Agriculture, Food and Nutrition Services, 2012).

Multi-track year-round school – This school calendar strategy is used to alleviate overcrowding in districts with constrained school facilities. Teachers and students are grouped into tracks and assigned different school schedules (Johnson & Spradlin, 2007).

Preexisting group – A group that has not been randomly assigned; rather, it has been naturally formed (Baltimore County Public Schools, 2010).

Single-track year-round school – This school calendar strategy eliminates the traditional extended summer break and redistributes school days throughout the entire year. Short intermissions are implemented, allowing time for remediation and enrichment (Johnson & Spradlin, 2007).

Student achievement in math – The percentage of students that met proficiency or advanced proficiency on standardized math tests administered by the state of New York.

Summer learning loss – The information that students forget during the long summer break in traditional school calendars (Alexander et al., 2007).

The Equity Project charter school (TEP) – A middle school in the Washington Heights community of Manhattan in New York City. TEP serves students in grades kindergarten to second and fifth to eighth. TEP has been in operation since 2009 and has had their charter renewed twice.

Traditional calendar – This calendar strategy is a school calendar where students attend school for 180 days (September to June) followed by an extended summer session of approximately three months (O’Sullivan, 2013).

Year-round calendar – This calendar strategy is a school calendar that more evenly distributes instructional periods across 12 months by redistributing the traditional

3-month summer break into shorter, more frequent breaks throughout the year (O'Sullivan, 2013).

Year-round education – This strategy involves the concept of reorganizing the school year in order to provide more continuous learning throughout the year (Graves, 2010).

Chapter Summary

This study performed a program treatment within TEP charter school to compare the impact of a single-track year-round schooling model on student achievement in math among students of low socioeconomic status. Utilizing TEP charter school allows the researcher to study this effect in a relatively controlled educational setting. Summer learning loss continues to be a cause for concern in education, specifically in low socioeconomic status populations (Evans, 2007). Attending single-track year-round schools could theoretically eliminate the negative effects of summer learning loss. Educational leaders and policy makers interested in positively affecting students from disadvantaged backgrounds need to consider implementing year-round school calendars. Closing the achievement gap for economically disadvantaged communities should be a priority in education. This study hoped to influence schools and school districts to consider year-round education as a reform for students of low socioeconomic status.

This chapter has provided an introduction to the study. Chapter 2 provides a review of the literature and Chapter 3 details the methodology for the study. Lastly, Chapters 4 and 5 discuss the data analysis and results of the study, relating these results to both prior literature and the research questions of this study.

Chapter 2: Review of the Literature

Introduction

Chapter 2 reviews the literature related to year-round education, particularly as it has been implemented in schools with students from low-socioeconomic backgrounds. The literature review is used to examine and synthesize previous research related to the history of year-round education, the various models of year-round education, the effects of summer learning loss, and the academic impact of year-round education specifically on economically disadvantaged students. The researcher also discusses how prior research informed the current study.

Researchers for the National Association for Year-Round Education, proposed that modifying the current traditional school calendar is the answer for appropriate time utilization (Davidson, Seo, Davenport, Butterbaugh, & Davidson, 2004). At-risk students, minority students, and students of low socioeconomic status enter school without the necessary skills to achieve academic proficiency and remain behind due to the lack of additional time required to address this deficiency. The National Commission on Time and Learning (1994) suggested that the issue of time utilization should be adjusted to meet the individual needs of the students, rather than the administrative convenience of adults.

History of Year-Round Education

According to Weiss and Brown (2003), “The school schedule is one of the great clocks in our society” (p. 24). Year-round education is not a new educational concept for

the United States; it actually has a long history that was not widely instituted until the late 19th century, when one of the measurements of a good school was the number of days it was open (Weiss & Brown, 2005). Oftentimes, the financial state of the district determined how long the school was open during the year. Schools with longer calendars were often perceived by the general public as more effective.

According to Hermanson and Gove (1971), in the early 19th century, most major cities had school calendars that were approximately 11 months long. In contrast, most rural schools were open for only six months of the year. At the time, the United States became the home for millions of European immigrants who did not speak English. In major cities, immigrants worked outside the home in factories, shops, and mills. The children of these immigrants struggled to become Americanized and to learn English. It was left to school districts to meet the needs of these families. Students often needed to attend school for a full year to learn English and later join the work force.

In rural areas, educating students was much different from education in major cities. Family members worked each day cultivating the land. Children were taught household and farming skills from their parents, as there was little need to learn much else. Schooling was offered only during the winter months in churches or one-room schoolhouses (Hermanson & Gove, 1971).

As our nation became more industrialized, the skills needed in the workplace became more advanced. Legislatures were concerned with the issue of whether or not equal educational opportunities were available to all students. Legislatures from rural and urban settings met and agreed on a set of minimum curriculum standards, and in 1900, the adopted number of instructional days were established at 180. Many large cities,

however, offered from 190 to 195 days in order to meet the needs of English language learners so that these students would be well prepared to enter the workplace. Although standards for school calendars were established early in our country's history, Hermanson and Gove (1971) asserted, "There has been some demand for calendar reform ever since" (p. 8).

As stated by Hunter (1998), year-round education has grown over 500% since the early 1990s. One reason for the large increase was the need to alleviate overcrowding due to increased enrollment. This calendar modification is called a *multi-track* schedule and it has been used in order to facilitate maximum building utilization when overcrowding was a pressing issue. This type of schedule allows one group of students to attend classes while another group is off. Overcrowding often gets year-round schools started, but there are many reasons for continuing to operate year-round schools. These reasons include student achievement, increased attendance, higher satisfaction for teachers, students, parents, and administrators, and maximizing building facilities (Hunter, 1998).

Year-round school models are an increasing educational reform in the United States. Currently, school districts in 46 states have a year-round school calendar. That represents a 100% increase since 1992. Around 3,181 schools across the country follow a year-round calendar. This amounts to 10% of all public school students (Fast Facts on Year-Round Education, 2018).

Models of Year-Round Education

Quinlan, George, and Emmett (1987) defined year-round schooling as a reorganization of the school calendar into instructional blocks and vacations distributed across the calendar year so that learning is continuous throughout the year. The school

year is designed in such a way that there is continuous learning and a number of shorter vacations (Kneese, 2000; NAYRE 2009). The primary goal is to minimize summer learning loss and work toward eliminating the amount of time used to review material from the previous school year (Ballinger, 1987). Year-round schooling can also be defined as terminology that promotes a paradigm that involves any reconfiguration of the school calendar that followed the traditional 180-day schedule; thus, learning is more continuous throughout the year (Serifs, 1990). There are several types of year-round reform models. They include single-track, multi-track, and extended school year. The single-track and multi-track models are 45/15, 60/20, 60/15, 90/30, trimester, quarter, and quinmester. The multi-track is implemented without a reconfiguration of the calendar to introduce days for intersessions or extended time. The options for the extended year are flexible all-year plans and 11-month plans (Ballinger, Kirschenbaum, & Poimbeauf, 1987; Mussatti, 1981).

The number of instructional days and the number of vacation or intersession days identifies the year-round school model. For example, the 45/15 schedule indicates that there are 45 days of instruction and 15 days of vacation or intersession in a five session calendar (quinmesters). Another example is that of 90/30 with 90 days of instruction and 30 days of vacation or intersession in two semesters. For the single-track model, all students are in school at the same time. The multi-track is a little more complicated in that students attend school on various schedules. As one group rotates out for vacation,

another group rotates in for school. The multi-track schedule is used in schools where there is overcrowding (Glines, 1992; Mussatti, 1981; Peltier, 1991).

Ballinger, Kirschenbaum, and Poimbeauf (1987) stated that the trimester, quarter, and quinesters have students in school at any time during the school year. During these times, students have the option of attending school during off times for academic acceleration. The flexible all-year plan allows the students to attend at will and plan vacations during a time that is more advantageous to them. With the number of different year-round school models, many advantages and disadvantages exist. According to Peltier (1991), there are strengths and weaknesses in each plan. Thus, each district must examine closely the calendar or schedule that best fits students' needs. In addition, there are opportunities for educational institutions to create variations of the various plans that exist.

Glines (1992), conducted an urban middle school study that implemented a modified 45/15 (Mussatti, 1983) calendar as approved by the school board. The school year was divided into instructional periods with days of intersession or vacation time after each instructional period. There are 180 days in both the traditional and year-round calendar. In addition, the year-round calendar embedded 25 intersession days. The 25 days are used for focused remediation instruction and enrichment. The holidays are the same for year-round and traditional calendars. The calendar is made up of approximately 45 days of instruction and 15 days of intersession for additional learning (Glines, 1992; Kneese, 2000). The instructional days could vary from 39 to 52 days and the intersession days could vary from 5 days to 10 days. The teachers had the option of working during the intersession and earning additional money. The rate of pay for the teachers during

intersession was the same as the districts' summer school pay rate per day (Kneese, 2000). The families had the option to send their children to intersession for intervention or enrichment.

According to Kneese (2000), students are assigned to classes during the intersession based on their instructional needs. Students had the option of choosing an enrichment activity if their mathematics, reading, writing, history, and science grades were acceptable. Based on multiple criteria, core teachers evaluate the success of each student based on the mastery of essential skills. Those students who exhibited deficiencies were recommended for remediation. There was a maximum of 10 students per class.

Students were given a pretest and a posttest in the class assigned, resulting in individual needs being addressed. The intersession teacher reported the assessment data (pretest and posttest) to the instructional teachers for reference during the following grading period. Progress reports were mailed to parents at the end of each intersession. The administration kept an in-house database for reading, writing, mathematics, history, and science of student achievement during the intersessions. Attendance data were also kept in a database, as well as a record of the number of students who took advantage of the intersessions during the 3 years of dual track operation. Quantitative results were not identified, however, it was reported that teachers and parents were in favor of the calendar model.

Effects of Summer Learning Loss on Low Socioeconomic Students

A meta-analytic review of 39 research studies on the topic of the effects of summer vacation on achievement test scores conducted by Cooper (1996) indicated that

achievement test scores declined after summer vacations. “The meta-analysis indicated that the summer loss equaled about one month on a grade-level equivalent scale, or one tenth of a standard deviation relative to spring test scores” (Cooper, 1996, p. 227). The effect of summer break was more detrimental for math than reading and was most detrimental for math computation and spelling (Cooper, 1996). Another significant finding, as noted by Cooper (1996), was that this negative effect associated with summer vacation increased with student grade level. Cooper also suggested that the income differences may be related to differences in opportunities to practice and learn over the summer.

Prior research has suggested that there are gaps in math achievement for students after summer vacation (Heyns, 1978). In 1978, Barbara Heyns authored a book, *Summer Learning and the Effects of Schooling*, which explored the issues surrounding summer learning loss and the achievement gap. Using school year and summer achievement scores of middle school children in Atlanta, Georgia, the author concluded that there were achievement differences across social lines, race, ethnicity, and family income. The achievement levels of poor and disadvantaged students fell far behind those of children from economically advantaged families in the early grades; as time passed, these children lagged even further behind (Heyns, 1978). Heyns also stated, “Most children of privilege are privileged in all spheres of life: wealthy families usually live in good neighborhoods and send their children to good schools and support summer enrichment opportunities” (p. 12). Conversely, children from low-income families live in poor neighborhoods, lack the time and resources to provide summer enrichment, and attend schools that have high teacher turnover and scarce resources.

Gaps in academic achievement across socioeconomic lines are a longstanding and seemingly intractable problem. Alexander et al. (2007) asked, “Despite years of study and an abundance of good intentions, these patterned achievement differences persist, but who is responsible, and how are schools implicated?”(p. 11). To attempt to find answers to these issues, Alexander et al. conducted a study in which they compared achievement gains over the summer and over the school year separately.

A study conducted at the Baltimore-based Beginning School, where 77% of the students enrolled were African American and 66% of the students qualified as low income, provides a demographic model similar to many urban centers across the United States. Expanding on Heyns’s studies, Alexander et al. (2007) tracked students from first grade to the end of elementary school. Fall scores and spring scores were compared separately for Black, White, and low-income children, twice per year, and over a period of 2 years. The scores were used to examine achievement gains over the school year using fall to spring scores. In addition, spring to fall scores were used to examine summer gains. Alexander et al. concluded, “Much of the achievement gap originates over the summer period, when children are not in school” (p. 12). The authors concluded that educational opportunities for students during the summer are not equal across socioeconomic lines. Summer learning is dependent upon socioeconomic status and opportunity, as disadvantaged students struggle, while economically advantaged students thrive (Evans, 2007).

Low-income status children progress at a comparable rate to their wealthier counterparts during the school year, but may not be performing at the same level in terms of pacing by the end of the school year (Alexander et al., 2007). This deficit can be

connected to two sources: that poor students start school already behind their same age peers, and that during the summer, poor students lose ground being away from the school setting (Alexander et al., 2007).

Evans (2007) conducted a study comparing the academic achievement of students in year-round and traditional calendar schools in Indiana. The study compared the achievement of third grade students in language arts and math in both types of schools and further analyzed the achievement of low-income, minority, and special education students. Standardized assessment passing percentage rates on the Indiana Statewide Testing for Educational Progress-Plus (ISTEP+) were used to compare the achievement of students in 20 year-round schools and 1,109 traditional calendar schools that had been operating between the years of 2002 and 2005. Evans concluded, “There was a significant difference between passing percentage averages of traditional calendar and year-round calendar schools for third grade elementary students from low socioeconomic status” (p. 97).

Another study on reading during the summer was facilitated among 852 randomly selected students from 17 high poverty elementary schools in two large districts in Florida (Allington et al., 2010). These students were given a supply of self-selected trade books on the final day of school over a 3-year period. A total of 478 students from these same schools received no books. This study found that providing easy-access, self-selected books for summer reading over successive years did limit summer reading setback. Another finding from this study was that reading gains for students from the most economically disadvantaged families were larger, possibly the result of having access to books.

Another study on summer learning loss was conducted to examine the connection between children's social class and academic growth during kindergarten and first grade (Ready, 2010). This study found that the effects of schooling on cognitive development are stronger for low socioeconomic status students. This study supported the effects of summer learning loss on low socioeconomic status students.

A study conducted by Borman, Benson, and Overman (2005) targeted 300 early-elementary-school students from high-poverty schools. The authors used spring-to-fall reading achievement data to measure summer gains and losses. Their results suggested that parental expectations, learning activities in the home, and parental effort did not explain much variation in summer achievement. A suggestion they made from their findings was "that a voluntary summer school program developed specifically to avert the summer achievement slide can have positive effects on students' summer learning" (p. 147). Finally, the authors mentioned the need for parents and schools to interact more to ensure students attend and get the most out of academic summer programs.

Another important study focused on a summer enrichment program intended to help low socioeconomic status students stay engaged during the summer months (Green et al., 2011). This study used a pretest–posttest design to investigate how their enrichment program would affect summer learning for elementary students. The specific areas explored were academic gains in selected curriculum areas over the summer months and first-quarter grade averages in science, math, and reading in the subsequent academic school year. The pretest and posttest scores showed improvements in every subject during the summer enrichment program. Student performance in the first quarter also indicated student success. The results of this study suggested low socioeconomic status

students are in need of engagement during summer months to continue their academic development (Green et al., 2011).

Advocates of year-round school models support the notion that parts of the summer should be guided towards academic activities, mainly for students with low socioeconomic status. Most of the achievement gaps identified in research occur in the early years of elementary school. A year-round school calendar for those students is certainly an option that can address these educational issues.

Academic Impact of Year-Round Education and Closing the Achievement Gap on Economically Disadvantaged Students

Gabrieli, (2011) examined the Extended Learning Time schools that served underprivileged students in Massachusetts. The results of the study showed higher levels of academic achievement than traditional calendar schools with large populations of students from low socioeconomic backgrounds. Providing more time on task and focusing on students' individual needs through personalized teaching strategies were contributing factors to student success (Gabrieli, 2011).

Angrist, Dynarski, Kane, Pathak, and Walters (2012) applied a quantitative approach to examine the progress of students at one of the most economically disadvantaged Knowledge Is Power Program (KIPP) schools in Massachusetts. The authors found that students made significant gains in reading and math achievement each year they were enrolled in the school. The results of these studies indicated that a year-round school calendar could benefit students from low socioeconomic backgrounds. Academic success can be achieved if education models allowed more time to provide educational interventions like focused time on task, differentiated instruction, flexible

groupings, and individualized instruction. If year-round school calendars can provide an academic benefit for students from low socioeconomic backgrounds, then the instructional progression provided might also be helpful to the academic progress of this disadvantaged population of students (Angrist et al., 2012).

According to the Northwest Evaluation Association (NWEA), it is a well-researched fact that there is a difference between the academic achievement of disadvantaged students and students from affluent communities, as well as between minority students and their non-minority counterparts. This is referred to as the *achievement gap*. NWEA conducted a study to examine the achievement gap using a sample of students from across the United States by measuring student growth and achievement using a continuous, cross-grade measurement scale. Mathematics and reading scores in grades 3 through 8 were analyzed and the following results were reported:

- An achievement gap exists between students in low-poverty schools and those in high-poverty schools.
- In mathematics, students enrolled in high-poverty schools tend to grow less academically during the school year than students reenrolled in low-poverty schools.
- African-American students grow less academically during the school year than students in other groups. This difference is more noticeable in mathematics than in reading.

- Low-performing students in all groups continue to grow during the summer months, but African-American students, Hispanic students, and students enrolled in high-poverty schools tend to grow less.
- High-performing students enrolled in high-poverty schools lose more achievement during the summer than similar students who are enrolled in low poverty schools (NWEA, 2006, p. 1).

As students get older, the achievement gap expands. Fairchild (2002) reported that when students of low socioeconomic status enter fifth grade, they are up to 2 years behind their peers of higher socioeconomic status in reading comprehension and reading recognition skills. Summer breaks have a negative effect on students' academic retention, which appears to be even more significant for students with special education needs as well as students from families of low socioeconomic status (Alexander et al, 2007; Cooper, 2003; Davies, 1999; Fairchild, 2002).

In 1996, Cooper et al., suggested that mathematics computation was even more likely to be influenced by summer learning loss than reading. Students are most likely to forget skills learned through repetition, such as math facts and computation skills, whereas concepts are generally preserved at a higher level. According to Cooper et al. (1996), prior research has demonstrated a steady decline in achievement from third grade on. Students from low socioeconomic groups showed even larger declines in achievement scores in reading and language skills compared to their higher socioeconomic peers (Cooper et al., 1996).

According to Alexander et al. (2007), children learn at school as well as at home, especially in the primary grades, identified as kindergarten through third grade. Parents

teach and reinforce letter recognition, number skills, and reading skills to their young children at home. Parents who did well in school themselves generally have the tools to help their children and model behaviors that lead to success in school. Conversely, many low socioeconomic status parents suffer from low literacy levels and will likely be unable to provide their children with enriching experiences that can lead to success in school.

A limitation to acknowledge in many studies was that they identified a connection between year-round education and academic achievement focused on an entire student population. There was rarely a disaggregation of results to explain the impact on specific student subgroups. In order to support consistently low performing students, it is crucial for researchers to analyze the effect of year-round schooling on students at risk for academic failure. The findings from studies that have provided information on the impact of year-round schooling on students from low socioeconomic backgrounds have produced conflicting results (Coopersmith, 2011; Evans, 2007; Graves, 2011; Korth, 2005; Lindsay-Brown, 2010; Merrill, 2012; Smith, 2011; Winkelmann, 2010).

Some researchers found that attending a year-round school significantly improved the mathematics and reading performance of students from low socioeconomic backgrounds (Coopersmith, 2011; Evans, 2007; Korth, 2005; Smith, 2011; Winkelmann, 2010). Coopersmith (2011) and Smith (2011) found that attending a year-round calendar school resulted in increased academic performance in all subject areas for students from low socioeconomic backgrounds. Evans (2007) reported that year-round schools with large populations of students eligible for free or reduced-cost lunch programs received higher scores on state standardized reading and mathematics tests than students in traditional calendar schools with similar populations.

A 2005 study conducted by Korth focused specifically on students from low socioeconomic backgrounds. Korth (2005) discovered that year-round schools significantly outperformed traditional calendar schools on state standardized tests. In addition, although Winkelmann's (2010) study found discrepancies between mathematics and reading achievement scores for the overall student population, a disaggregation of data revealed that year-round education significantly improved both mathematics and reading achievement scores for students from low socioeconomic backgrounds.

The impact of year-round schools on low socioeconomic student achievement has not been uniformly positive. Some researchers determined that year-round education had no significant influence on, or was harmful to the academic performance of students from low socioeconomic backgrounds (Graves, 2011; Lindsay-Brown, 2010; Merrill, 2012). Graves (2011) used detailed longitudinal data to conclude that year-round education had significant negative effects on the academic performance of students from low socioeconomic backgrounds. Lindsay-Brown (2010) and Merrill (2012) found attending year-round schools produced no significant improvement in academic performance for students from low socioeconomic backgrounds in math and reading.

Lindsay-Brown (2010) used a quantitative, cross-sectional approach to examine the impact of year-round education on student achievement in South Carolina elementary schools. A potential limitation to the study was the measure for testing student achievement. The study only measured student's mean difference in academic achievement; for students of low socioeconomic status who are starting several years behind their economically advantaged counterparts, testing for mean difference did not capture growth attained throughout the school year, even if that growth was significant

(Lindsay-Brown, 2010). The mean difference only captures whether students are academically proficient.

In spite of these negative results, most research that has addressed the impact of year-round education on students from low socioeconomic backgrounds favors the conclusion that a balanced school calendar can lead to improved academic achievement. Of course, the studies that report a nonexistent or negative influence on student achievement should not be disregarded. More research is needed across a broader spectrum of students utilizing a measure of growth assessment, as well as proficiency, for educational stakeholders to decide whether year-round schooling can improve the academic achievement of traditionally low performing students from low socioeconomic backgrounds. Educational leaders and researchers want to know whether year-round education can improve students' overall academic performance (Anderson, 2009; Coopersmith, 2011; Evans, 2007; Korth, 2005; Lindsay-Brown, 2010; Mitchell-Hoeffler, 2010; Ramos, 2006; von Hippel, 2007). Although this topic has been studied many times, the findings related to academic achievement have been conflicting (Anderson, 2009; Coopersmith, 2011; Evans, 2007; Korth, 2005; Lindsay-Brown, 2010; Mitchell-Hoeffler, 2010; Ramos, 2006; von Hippel, 2007).

Several researchers have found a positive correlation between year-round education and improved academic achievement. Anderson's (2009) quasi-experimental approach compared the academic performance of students attending year-round calendar schools and traditional calendar schools. A study of elementary schools located near military bases in Hawaii revealed that students in year-round schools performed significantly better on academic achievement tests than students from traditional calendar

schools. Evans' (2007) quantitative comparative study determined that students in year-round elementary schools in Indiana received higher achievement test scores than students at traditional calendar schools. Coopersmith (2011) used a quantitative comparative approach to examine the impact of year-round school calendars on academic achievement in Texas middle schools and ascertained that students attending year-round schools performed better on academic achievement tests compare to similar students attending traditional calendar schools.

Conducting a longitudinal comparison on student achievement in year-round and traditional calendar schools in California revealed that students attending year-round schools outperformed students at traditional calendar schools by almost 100% (Korth, 2005). Ramos' (2006) posttest study of three schools-within-a-school, year-round elementary schools in the United States found that fifth grade students in year-round programs statistically outperformed students from traditional calendar schools. Smith (2011) conducted a longitudinal study using the natural experiment that occurred when a large number of schools in Wake County, North Carolina were transitioned to year-round calendars. Smith's study revealed that year-round education resulted in improved academic achievement for students from low socioeconomic backgrounds and for students with special needs. Lastly, Winkelmann (2010) completed a quantitative, comparative study comparing the academic effectiveness of year-round and traditional calendar elementary schools in Indiana. Winkelmann found that year-round education resulted in an overall improvement in students' mathematics achievement, and a significant improvement in mathematics and reading achievement for students from low socioeconomic backgrounds.

Researchers who found that year-round education improved academic performance noted that mathematics achievement scores were significantly higher for students attending year-round schools (Anderson, 2009; Evans, 2007; Ramos, 2006; Winkelmann, 2010). This phenomenon was supported by previous research findings, which stated that fact-based or procedural knowledge is easily forgotten over the summer break in traditional calendar schools (Cooper et al., 1996). Attending school on a year-round schedule provides more opportunities for information to be retained. This phenomenon is also known as the spacing effect, which is an application of early learning theory (Karpicke & Bauernschmidt, 2011; Roediger et al., 2010).

Findings from the above-mentioned studies support year-round education because the reviewed study samples represent a vast variety of geographic locations and educational levels. The studies presented are diverse in sample and structure. The diversity of studies is important because it increases the external validity of the correlation between year-round education and academic achievement. Although these studies measure similar variables, the target populations show a great deal of variety, which makes it possible to distinguish the results and apply findings to other populations.

Despite the preponderance of evidence supporting year-round schooling, several studies have indicated that year-round schooling has no impact on students' academic achievement (McMillen, 2001; McMullen & Rouse, 2012; Mitchell-Hoeffler, 2010). McMillen's (2001) longitudinal investigation of 345,000 students from North Carolina public schools in grades 3-8 is one of the most frequently cited studies in the field of year-round education. The researcher found that academic achievement in year-round schools was no different from traditional calendar schools (McMillen, 2001). Similar

results were offered by McMullen and Rouse (2012), who used a natural experimental design comparing the academic achievement of students in year-round and traditional calendar schools in North Carolina. The study found that school calendar had no impact on the academic achievement of the average student. However, the study data were not disaggregated into subgroups to determine whether student achievement affected any specific group of students. Mitchell-Hoeffler (2010) conducted a mixed methods comparison of the academic achievement of students at year-round and traditional calendar schools in a large school district in the Southeastern United States. The study revealed that students in year-round schools did not perform significantly better on achievement tests than students at traditional calendar schools.

Further, although Winkelmann's (2010) study of Indiana elementary schools produced a positive correlation between year-round education and achievement in mathematics, the results also indicated that attending a year-round school had no impact on students' reading achievement. Similarly, a longitudinal comparative study performed by von Hippel (2007) reported that in one year, the academic achievement scores for mathematics and reading improved the same amount for kindergarten and first grade students in both year-round and traditional calendar schools. Wu and Stone (2010) presented the findings of a longitudinal study administered using 6 years of data from 4,569 California public schools. The findings revealed that year-round education did not affect outcomes or growth related to scores on a state standardized test. Finally, Merrill (2012) conducted a quantitative causal-comparative study to determine the impact of year-round education on the standardized test performance of African-American fifth graders in an urban school. The findings of this study indicated that there was no

significant difference between the achievement scores of student groups attending year-round and traditional calendar schools (Merrill, 2012).

These mixed results suggest that summer learning loss cannot be easily correlated to the summer breaks found in traditional school calendars. According to McMullen and Rouse (2012), learning loss may not be attributed to the number of consecutive days that students are out of school. An extended school year format of year-round education would be effective because it would increase the existing number of teaching days and add additional instructional hours. As stated previously, another consideration is how these studies chose to measure student achievement. With a focused on proficiency as a measure of student achievement in year-round schools, the research remains unable to determine if year-round education has an impact on student achievement alone. Data may not yield statistically significant results. Testing student growth percentiles, particularly when studying students from low socioeconomic backgrounds and English language learners, may be a more appropriate measure of success.

Taking into account these results, one would question why families would choose to send their children to year-round calendar schools if they do not provide an academic advantage. More research is needed to determine whether there are external variables associated with choosing a school calendar that may have an influence on students' academic success.

Graves (2010) found that year-round education had an adverse effect on reading and math scores related to students' national percentile ranks. Graves used 8 years of longitudinal data from California to compare the academic performance of students attending schools with multi-track, year-round calendars and students attending

traditional calendar schools. The results are attributed to the frequency of educational breaks in year-round schools, which interrupt the continuity of learning that is needed for long-term concept retention (Graves, 2010). More research is needed to determine whether these results can be duplicated. Research on continuous learning and brain function also can be used to support or refute the findings of this study. When compared to national percentile rank associated with reading, mathematics, and language, multi-track calendar schools scored 1-2 percentile points lower than traditional calendar schools (Graves, 2010).

Following up on this study, Graves (2011) examined the impact of multi-track schools on students who are traditionally-disadvantaged within California. The students who are traditionally-disadvantaged include English language learners, African American students, low-socioeconomic students, and Hispanic-Latino students. The findings included significant negative effects on all groups located within a multi-track model (Graves, 2011). When compared to students at the 25th and 50th percentile on nationally-standardized tests, students who are traditionally-disadvantaged scored much lower with a one or two year difference. Thus, according to Graves (2011), a multi-track model configuration can negatively impact student learning.

Similar to the study by Graves (2011), results reported by McMullen and Rouse (2012) showed negative academic achievement within multi-track year-round schools. In the study, McMullen and Rouse examined student achievement data sets within multi-track schools in Wake County, NC. Data were reviewed from the North Carolina Department of Instruction in conjunction with Duke University. Results showed that overly-crowded multi-track schools have a negative impact on reading achievement, as

well as no significant data difference among math achievement. The authors discovered that a small negative impact on student achievement occurred when using mobile classrooms (McMullen & Rouse, 2012).

Studies examining the impact of year-round school calendars on student achievement have produced conflicting results. In just the last 3 years, research studies on this topic have reported positive student achievement, negative student achievement, and nonexistent student achievement (Coopersmith, 2011; Graves, 2010; McMullen & Rouse, 2012). In order to achieve clarity and some reliable direction in this important debate, researchers must continue to examine other variables related to academic achievement in year-round and traditional calendar schools. According to Huebner (2010), the effectiveness of year-round schools may be related to more than calendar modification. Possible solutions could be remediation or enrichment during academic breaks or embracing a new school vision. These new interventions may improve on results related to year-round schooling. Conversely, if schools adopt year-round calendars without changing any other part of the educational program then academic achievement is likely to remain stationary.

Chapter Summary

Chapter 2 presents a review of literature and research on the effects of year-round education when compared to traditional education on student achievement in math, particularly for students with low socioeconomic status. Year-round education can be beneficial depending on the need of the school. A multi-track, year-round school calendar model is useful for schools if over capacity is an issue; however, a multi-track year-round model has shown inconclusive and even negative results when measuring for impact on

student achievement. A single-track, year-round school calendar model is designed to combat summer learning loss, particularly for disadvantaged students.

The literature review focused on the history of year-round education, definitions of year-round education, the effects of summer learning loss, and the academic impact of year-round education, particularly on economically disadvantaged students. It is important to note that the researcher intentionally omitted literature and research on teacher unions, the summer camp culture, and parents who are accustomed to traditional summer breaks.

The literature around summer learning loss among students of low socioeconomic backgrounds shows mixed results. Studies that only measure student proficiency generally have been inconclusive. However, studies that measure student growth show significant gains for students of low socioeconomic status, as well as closing of the achievement gap. Chapter 3 focuses on research design and methodology around the effects of year-round education and traditional education on student achievement in math from students with low socioeconomic status.

Chapter 3: Research Design Methodology

Introduction

This study was designed to determine if there is a difference in student achievement in math between a year-round school calendar and a traditional school calendar at TEP charter school, as measured by the New York State math assessment. Participation in the study included a cohort of students who only received a traditional school calendar and a cohort of students who only received a year-round school calendar. Both groups had similar, instructional personnel, and demographics, including similar numbers of low-socioeconomic status students. This study analyzed differences between middle school students' New York State math assessment scores, specifically, average proficiency ratings and median growth percentiles for the 2009-2010 cohort and the 2014-2015 cohort.

Research Question

RQ1. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ2. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ3. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ4. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ5. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ6. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ7. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ8. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth

grade students attending TEP under a year-round calendar, when using growth as a measure of success?

This study utilized a quantitative methodology with a causal comparative quasi experimental research design because data from a preexisting group were used. A preexisting group means this group has not been randomly assigned; rather, it has been naturally formed. The independent variable for the study was the school calendar, which could not be manipulated by the experimenter. The dependent variable was the academic achievement on the New York State assessment in math. Therefore, the impact of a year-round calendar on students' academic achievement in math was measured. In addition, there was an identified control group to the population of low-socioeconomic status students who attended a year-round calendar school. These students were compared to similar low-socioeconomic status students who attended a traditional calendar school, which means they were not exposed to the intervention (year-round calendar school).

Research Context

TEP charter school opened in September of 2009 in the Washington Heights neighborhood of New York City. Originally a fifth through eighth grade middle school, TEP now also serves students in kindergarten, first grade, second grade, and will soon be adding pre-kindergarten, third grade, and fourth grade, eventually becoming a pre-kindergarten through eighth grade school serving 1,200 students. TEP serves approximately 480 students in Grades 5-8 in the Washington Heights neighborhood of Upper Manhattan in New York City. Washington Heights is a predominantly Dominican neighborhood located in NYC Community School District 6.

Research Participants

The sample size was comprised of students in Grades 5-8 from two different cohorts who attended TEP charter middle school: the first in academic years 2009-2013, and the second in academic years 2014-2018. Table 3.1 lists the enrollment of students for each of the tested cohorts who received the New York State (NYS) math assessment.

Table 3.1

Number of Enrolled Students who Received the NYS Assessments Each Year from the Year-round Cohort and the Traditional Cohort

Grade	Cohort A		Cohort B	
	Traditional Calendar	Number of Students	Year-Round Calendar	Number of Students
5	2009-2010	124	2014-2015	120
6	2010-2011	122	2015-2016	121
7	2011-2012	112	2016-2017	114
8	2012-2013	107	2017-2018	111

Demographically, TEP's 2018-2019 student population was as follows:

- 93% of the students were Latino, 5% African American, and 2% other.
- 90.7% of the students were eligible for free or reduced lunch.
- 24% of the students were classified as English language learners (ELLs).
- 23% of the students were Special Education.

Instruments Used in Data Collection

In order to test and answer the established research questions, archival data were used for statistical analysis. In order to determine statistical significance of achievement

differences, if present, between the traditional school calendar and the year-round school calendar, New York State math assessment scores were collected and measured.

Data collected included New York State math assessment scores of students from TEP charter middle school, grades 5-8.

The New York State math assessments are used each year as a way to hold schools accountable for meeting proficiency ratings, with the goal of creating students who are ready for success in college and/or careers (Kendall, 2011). This instrument provides the opportunity to use a valid and reliable source due to the high standard of ethical implementation. To ensure that measuring success was equitable to all students, this instrument provided both a proficiency index and growth index.

For the purpose of this study, proficiency was defined as grade level achievement on the New York State math assessment (NYSED:IRS, n.d). Proficiency was identified by levels and ratings. Proficiency, according to the Common Core state standards, is any student who scores a 3 or higher on a scale of 1.00 – 4.50. This index is used to determine whether a student has reached grade level achievement. However, the index does not account for the growth a student made even if proficiency was not attained. The second index focuses on growth as a measure of success.

Student growth on the New York State math assessment determines how much a student achieves relative to their peer group over one academic school year. The state of New York measures student growth using the following set of steps:

Step 1: Match a student with all peers in NYC using grade level, state assessment proficiency rating, English Language Learner status, Individualized Educational Plan status, and temporary housing or public assistance eligibility status.

Step 2: Narrow the peer group to the closest 50 students that meet the same likeness; this is called the comparison group.

Step 3: Using the math state assessment, determine how each particular student performed relative to their comparison group to determine success as a measure of growth (NYSED:IRS, n.d).

The NYS assessment provides proficiency ratings on a scale of 1.00 to 4.50. Table 3.2 provides clarity in terms of the proficiency ratings used by the NYS assessment. In addition, Table 3.3 illustrates the growth percentiles for understanding.

Table 3.2

Understanding Proficiency Ratings

Proficiency Ratings (1.00 to 4.50)

- 4: Advanced Proficient - Exceeding New Common Core Grade-Level Standards
 - 3: Proficient – Meeting New Common Core Grade-Level Standards
 - 2: Below Proficient – Partially but Not Sufficiently Meeting New Common Core Grade-Level Standards
 - 1: Well Below Proficient – Insufficiently Meeting New Common Core Grade-Level Standards
-

Note. Adapted from www.engageny.org.

Table 3.3

Growth Percentiles

Understanding Growth Percentiles (1 to 100)

Definition:

A student's growth percentile compares a student's growth to the growth of all students in the same comparison group who started the year at the student's same proficiency rating. The higher the student's growth percentile, the greater the student's growth relative to his or her comparison group across New York City.

Examples:

- A student with a growth percentile of 75 scored better than 75% of all other students in the same comparison group who started the year at the student's same proficiency level. This would indicate the student grew more than most of his/her peers that share the same likeness profile across the city!
 - A student with a growth percentile of 54 scored better than 54% of all other students in the same comparison group who started the year at the student's same proficiency level. This would indicate that the student grew more than about half of his/her peers that share the same likeness profile across the city.
 - A student with a growth percentile of 27 scored better than only 27% of all other students in the same comparison group who started the year at the student's same proficiency level. This would indicate that the student grew more than only about a quarter of his/her peers that share the same likeness profile across the city.
-

For this study, New York State math assessment score was the dependent variable. The operational description of the levels students receive on the Common Core state standards tests are “well below proficient,” “below proficient,” “meeting proficiency,” or “advanced proficient” (NYSED:IRS, n.d).

The year-round calendar is the independent variable representing the intervention being implemented at the school. For the purposes of this study, the operational definition of year-round calendar is a school year that redistributes the 180 school days into three trimesters, eliminating a 3-month summer to prevent summer learning loss. Summer learning loss is the term used for the information students forget during the long summer break in traditional school calendars (Alexander et al., 2007). Year-round schools have a 5-week break in the summer and 3-week breaks at the end of each trimester during the academic school year. The dependent variables for the analyses included proficiency ratings and growth percentiles, which are interval data because the data comes in the form of a numerical value, where the difference between points is standardized and made meaningful. The scale of measurement for the dependent variable is an interval scale because the data are categorized and also ranked. Finally, the scale of the independent variable is nominal because a year-round calendar or traditional calendar represent categories.

To obtain data for the study, the New York State math assessment scores were collected from the 2009-2010 student cohort and the 2014-2015 student cohort, state exam data for both cohorts were collected over a 4-year period. These data are available to the public through the website (New York State Education Department Information and Reporting Services, n.d.), where spreadsheets containing New York State math

assessment results can be accessed. These charts report the following categories: students, grades, proficiency level, proficiency rating, and growth percentile.

Data Analysis

A quasi-experimental research design was used to test whether statistical significance exists between student math results from a year-round middle school calendar and student math results from a traditional middle school calendar at TEP charter school. In addition, the primary source of data collection was archival data. All statistical analyses were done using the Statistical Package for the Social Sciences (SPSS) version 25.0.

An independent samples *t*-test was used for this study because there was one dependent variable and exactly one independent variable, grouped into two categories (George & Mallery, 2012). A one sample *t*-test also was used to determine whether a sample of observations could have been generated by a process with a specific mean. The goal of this study was to determine whether there is a significant difference in the academic achievement in math among low-socioeconomic status students who attended a year-round calendar school compared to similar low-socioeconomic students who attended a traditional calendar school.

For this particular study, preexisting data were utilized. Therefore, this research study did not include any contact or interaction between the researcher and the subjects. Public records were utilized for the data collection for this study, eliminating concern for certain ethical issues.

Furthermore, the data collection process did not begin until the Institutional Review Board (IRB) application and supporting documentation were reviewed and

approved. Lodico, Spaulding, and Voegtle, (2010) stressed the importance of submitting IRB documents and receiving approval before any data are collected in a study. Once approval was obtained, the data collection process was implemented. Finally, there was no possibility for harm to participants, as there was no contact with human subjects and the data included only preexisting, de-identified, public data. Therefore, no ethical issues were encountered during this study.

Summary

The purpose of this quantitative study was to compare the academic growth in the area of math among low-socioeconomic students attending a year-round calendar school to similar low-socioeconomic students who attended a traditional calendar school in the state of New York. This information was compiled from two different cohorts at TEP charter middle school. To analyze the data, an independent samples *t*-test and a one sample *t*-test were used to compare the achievement and progress of two student cohorts at TEP, one in which the students received only a traditional school calendar and one in which the students received only a year-round school calendar. This research helped identify whether improved academic growth is occurring in the areas of math in the year-round calendar setting at TEP charter middle school compared to a control group having a traditional school calendar.

Limitations of this research on the impact of year-round calendars compared to traditional calendars should be mentioned. First, the sample for this study was limited to students who only attended TEP charter middle school. Therefore, although inferential statistics such as *t*-tests are used to infer to the larger population of interest, the limited study sample may support results that may not be an accurate representation of the

population of all students attending year-round calendar schools or traditional calendar schools. In addition, the selection of the population is limited to only the 2009-2010 and 2014-2015 cohorts.

Due to the research design being ex post facto in nature, the researcher could not control all extraneous variables that may potentially affect the dependent variables under consideration. For example, this study did not address social and cultural factors, such as mother's education level or value placed on education, which may affect student achievement. Variables that also may affect student achievement, such as teacher effectiveness (i.e., turnover, experience, classroom pedagogy), as well as nutrition, family background, parent involvement, and medical issues within the student population were not identified. Nevertheless, the study contributes additional evidence to any school system considering implementing or transitioning to a year-round calendar relative to the impact of student achievement and the cost of this particular reform.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to compare the academic growth and proficiency in the area of math of low-socioeconomic students in a year-round school calendar versus the performance of a similar cohort of students who experienced a traditional school calendar at TEP charter school. The cohort attending TEP charter school with a traditional cohort did so in the academic years 2009 – 2013. Those who experienced a year-round calendar at TEP attended in the years 2014 – 2018. The demographic breakdown of both cohorts was very similar.

This chapter presents the findings of the data analysis, which are used to answer the research questions and test the research hypotheses. Furthermore, this chapter provides a description of the sample, a summary of the results, and a detailed analysis of the data. Finally, in the results section, how the research hypotheses are tested is discussed, along with whether each null hypothesis was retained or rejected. A quasi-experimental design was chosen because data were preexisting. The study was non-experimental in that the researcher did not influence or adjust the modified calendar used by TEP. The math state exam scores were gathered from archival data provided by the Department of Education in New York City.

To recap, success was measured using both proficiency and growth percentiles as a metric to determine whether year-round education had a significant impact on student achievement. Proficiency is defined as grade level achievement on the New York State

math assessment (NYSED:IRS, n.d). Proficiency was identified by levels and ratings. Proficiency, according to the Common Core state standards, is any student who scores a 3 or higher on a scale of 1.00 – 4.50. This index is used to determine whether a student has reached grade level achievement. Student growth percentiles on the New York State math assessment determines how much a student achieves relative to their peer group over one academic school year. The state of New York measures student growth using the following set of steps. Match a student with all peers in NYC using grade level, state assessment proficiency rating, English Language Learner status, Individualized Educational Plan status, and temporary housing or public assistance eligibility status. Narrow the peer group to the closest 50 students that meet the same likeness; this is called the comparison group. Using the math state assessment, determine how each particular student performed relative to their comparison group to determine success as a measure of growth (NYSED:IRS, n.d). The hypotheses for this study reflected the assumption that a year-round instructional calendar would have a positive impact on student achievement in math.

Research Questions

Year-round and traditional calendars serving TEP students from low-socioeconomic backgrounds served as the independent variable for this study, and the New York math state exam results served as the dependent variable for this study. The following research questions and hypotheses guided this research:

RQ1. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade

students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ2. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ3. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ4. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ5. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ6. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ7. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ8. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

The quasi-experimental nature of the study examined whether a modified calendar reform had an impact on student achievement in math for students of a low-socioeconomic background. Based on the research questions, the following null hypotheses were tested:

H₁: There is no difference in achievement in math between fifth grade students who attended TEP under a traditional calendar and fifth grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

H₂: There is no difference in achievement in math between sixth grade students who attended TEP under a traditional calendar and sixth grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

H₃: There is no difference in achievement in math between seventh grade students who attended TEP under a traditional calendar and seventh grade students who attended

TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

H₄: There is no difference in achievement in math between eighth grade students who attended TEP under a traditional calendar and eighth grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

H₅: There is no difference in achievement in math between fifth grade students who attended TEP under a traditional calendar and fifth grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

H₆: There is no difference in achievement in math between sixth grade students who attended TEP under a traditional calendar and sixth grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

H₇: There is no difference in achievement in math between seventh grade students who attended TEP under a traditional calendar and seventh grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

H₈: There is no difference in achievement in math between eighth grade students who attended TEP under a traditional calendar and eighth grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

Data Analysis and Findings

Research Question 1. The first research question asked: Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success? To address this question, math achievement among fifth grade students first was assessed to see if the students' scores were significantly different from standard proficiency at a value of 3 to identify whether students in both groups (traditional calendar and year-round calendar) obtained proficiency. Second, math achievement differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₁: There is no difference in achievement in math between fifth grade students who attended TEP under a traditional calendar and fifth grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

TEP's fifth grade proficiency data results for the traditional calendar low socioeconomic status (SES) cohort during 2009 – 2010 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean proficiency score was significantly less than the standard value of 3 ($M = 2.80$, $SD = .642$, $t = -3.53$, $p = .001$; see Table 4.1). Table 4.1 also provides TEP's fifth grade proficiency data results for the year-round calendar low SES cohort during 2014 – 2015 school year, which also used a One Sample *t*-test. Results for the year-round sample showed that the cohort mean proficiency score was lower for this group compared to the traditional group and also was

significantly less than the standard value of 3 ($M = 2.59$, $SD = .798$, $t = -5.50$, $p = .000$; Table 4.1).

Table 4.1

TEP's fifth Grade Traditional and Year-Round Proficiency Results - One Sample T Test

	n	Test Value = 3				95% CI of the Difference			
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional fifth grade proficiency results	124	2.797	.642	-3.53	123	.001	-.204	-.318	-.089
Year round fifth grade proficiency results	113	2.587	.798	-5.50	112	.000	-.413	-.562	-.264

Therefore, these two analyses reject the null hypotheses H_0 , supporting significant differences between fifth grade traditional calendar as well as year-round calendar reform in math achievement from the expected proficiency level of 3, as established by the New York State math assessment.

To further analyze the data, an independent sample t -test was used to test whether there was a significant difference between the fifth grade proficiency scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation; however, the data failed to meet the equal variance assumption using Levene's statistic ($F = 10.540$, $p = .001$). Results supported a significant difference ($t = 2.213$, $p = .028$) between the scores for traditional fifth grade students ($M=2.7965$, $SD=0.64211$) and the year-round fifth grade students ($M=2.5869$, $SD=0.79825$), as shown in Table 4.2. These results suggested that traditional calendar fifth graders are significantly more successful

than their year-round counterparts when identifying proficiency as a measure for success.

Table 4.2

TEP's fifth Grade Independent Sample T-test - Proficiency Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
fifth grade proficiency	2.213	214.97	.028	.210	.095	.023	.396

Therefore, the results of the independent sample *t*-test rejected the null hypothesis, supporting a statistically significant difference between the traditional calendar fifth grade low SES student cohort and the year-round reform fifth grade low SES student cohort, with the traditional group scoring higher than the year-round group.

In summary, the first *t*-tests compared the traditional school calendar cohort with the year-round calendar cohort. The purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in terms of mean proficiency on the New York State assessment, which would identify a relationship between the variables.

The one sample *t*-test indicated that the traditional calendar cohort had a mean proficiency ($M = 2.7965$, $SD=0.64211$) that was higher than the year-round calendar cohort ($M = 2.5869$, $SD=0.79825$), and both groups' scores were significantly different than expected proficiency at a value of 3. The difference in scores between the two groups also was statistically significant ($p = .028$). Thus, the null hypotheses (H_1) for the fifth grade students is rejected, supporting that both cohorts failed to reach proficiency (as defined as level of 3), that the traditional cohort had a higher mean proficiency score than the year-round cohort, and that this difference between the two groups was statistically

significant. It is important to note that New York State fully adopted the common core standards in 2014 (Kober & Stark-Rentner, 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 2. The second research question asked: Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success? To address this question, math achievement among sixth grade students first was assessed to see if the student scores were significantly different from standard proficiency at a value of 3 to identify whether students in both groups (traditional calendar and year-round calendar) obtained proficiency. Second, math achievement differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₂: There is no difference in achievement in math between sixth grade students who attended TEP under a traditional calendar and sixth grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

TEP's sixth grade proficiency data results for the traditional calendar low SES cohort during 2010 – 2011 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean proficiency score was significantly less than the standard value of 3 ($M = 2.864$, $SD = .679$, $t = -2.213$, $p = .029$; see Table 4.3), but that results for the year-round calendar low SES cohort during 2015 – 2016 school year

showed a higher mean proficiency score that was not significantly different from the standard value of 3 ($M = 3.08$, $SD = .861$, $t = 1.061$, $p = .291$; Table 4.3).

Table 4.3

TEP's sixth Grade Traditional and Year-Round Proficiency Results - One Sample T Test

	n	Test Value = 3					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional sixth grade proficiency results	122	2.864	.679	-2.213	121	.029	-.136	-.258	-.0144
Year round sixth grade proficiency results	121	3.083	.861	-1.061	120	.291	-.083	-.072	.238

Therefore, the results support that the null hypotheses for the year-round cohort in sixth grade (H_2) is upheld, supporting no significant differences between sixth grade year round cohort proficiency and the expected proficiency level of 3, as established by the New York State math assessment.

To further analyze the data, an independent sample t -test was used to test whether there was a significant difference between the sixth grade proficiency scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation; however, the data failed to meet the equal variance assumption using Levene's statistic ($F = 20.11$, $p = .000$). Results supported a significant difference ($t = -2.201$, $p = .029$) between the scores for traditional sixth grade students ($M=2.864$, $SD=0.679$) and the year-round sixth grade students ($M=3.083$, $SD=0.861$), as shown in Table 4.4. These results suggested that the year-round calendar sixth graders show significantly higher

proficiency than their traditional counterparts when identifying proficiency as a measure for success.

Table 4.4

TEP's sixth Grade Independent Sample T-test - Proficiency Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
sixth grade proficiency	-2.201	227.7	.029	.219	.0996	-.415	-.023

Therefore, the results of the independent sample *t*-test rejected the null hypotheses (H_2), supporting a statistically significant difference between the traditional calendar sixth grade low SES student cohort and the year-round calendar sixth grade low SES student cohort, with the year-round group scoring higher and within the defined proficiency level, compared to the traditional group.

In summary, for RQ2, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the sixth grade in terms of mean proficiency on the New York State assessment, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean proficiency ($M = 2.8639$) that was lower than the year-round calendar cohort ($M = 3.0831$), and this difference was statistically significant. Thus, the null hypothesis (H_2) is rejected, supporting a significant difference in mean proficiency between cohorts. The significant results suggest that year-round calendar reform has an impact on math student achievement in the sixth grade population of students from a low-socioeconomic background. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the

traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 3. The third research question asked: Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using proficiency as a measure of success? To address this question, math achievement among seventh grade students first was assessed to see if the student scores were significantly different from standard proficiency at a value of 3 to identify whether students in both groups (traditional calendar and year-round calendar) obtained proficiency. Second, math achievement differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₃: There is no difference in achievement in math between seventh grade students who attended TEP under a traditional calendar and seventh grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

TEP's seventh grade proficiency data results for the traditional calendar low SES cohort during 2011 – 2012 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean proficiency score was significantly greater than the standard value of 3 ($M = 3.400$, $SD = .572$, $t = 7.420$, $p = .000$; see Table 4.5), but that results for the year-round calendar low SES cohort during 2016 – 2017 school year showed a lower mean proficiency score that was not significantly less than the standard value of 3 ($M = 2.95$, $SD = .865$, $t = -.604$, $p = .547$; Table 4.5).

Table 4.5

TEP's seventh Grade Traditional and Year-Round Proficiency Results - One Sample T Test

	n	Test Value = 3					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional seventh grade proficiency results	112	3.400	.570	7.420	111	.000	.400	.293	.507
Year round seventh grade proficiency results	114	2.951	.865	-.604	113	.547	-.049	-.210	.112

Therefore, the results support that the null hypotheses for the traditional seventh grade cohort (H_3) is rejected, supporting a significantly higher proficiency score from the expected proficiency level of 3, and that the null hypothesis for the year-round cohort in seventh grade (H_3) is upheld, supporting no significant differences between seventh grade year round cohort proficiency and the expected proficiency level of 3, as established by the New York State math assessment.

To further analyze the data, an independent sample *t*-test was used to test whether there was a significant difference between the seventh grade proficiency scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation; however, the data failed to meet the equal variance assumption using Levene's statistic ($F = 35.85, p = .000$). Results supported a significant difference ($t = 4.614, p = .000$) between the scores for traditional seventh grade students ($M=3.400, SD=.571$) and the year-round seventh grade students ($M=2.951, SD=0.865$), as shown in Table 4.6. These results suggested that the year-round calendar seventh graders show significantly lower

proficiency than their traditional counterparts when identifying proficiency as a measure for success.

Table 4.6

TEP's seventh Grade Independent Sample T-test - Proficiency Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
seventh grade proficiency	4.614	196.1	.000	.449	.097	.097	.257

Therefore, the results of the independent sample *t*-test rejected the null hypotheses(H_3), supporting a statistically significant difference between the traditional calendar seventh grade low SES student cohort and the year-round calendar seventh grade low SES student cohort, with the year-round group scoring lower but still proficient, compared to the traditional group.

In summary for RQ3, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the seventh grade in terms of mean proficiency on the New York State assessment, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean proficiency ($M = 3.400$) that was lower than the year-round calendar cohort ($M = 2.951$), and this difference was statistically significant. Thus, the null hypotheses (H_3) is rejected, supporting a significant difference in mean proficiency between cohorts. The significant results fail to support a positive effect of the year-round calendar reform on math student achievement in the seventh grade population of students from a low-socioeconomic background. These results suggest that among the low SES population, traditional seventh graders are more successful than their year-round

counterparts when identifying proficiency as a measure for success. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 4. The fourth research question asked: Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success? To address this question, math achievement among eighth grade students first was assessed to see if the student scores were significantly different that standard proficiency at a value of 3 to identify whether students in both groups (traditional calendar and year-round calendar) obtained proficiency. Second, math achievement differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₄: There is no difference in achievement in math between eighth grade students who attended TEP under a traditional calendar and eighth grade students who attended TEP under a year-round calendar as measured by the proficiency standards established by New York State's math assessment.

TEP's eighth grade proficiency data results for the traditional calendar low SES cohort during 2012 – 2013 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean proficiency score was not significantly different from than the standard value of 3 ($M = 2.913$, $SD = .627$, $t = -1.441$, $p = .153$; see Table 4.7), and that results for the year-round calendar low SES cohort during 2017 – 2018 school

year showed a higher mean proficiency score that also was not significantly different from the standard value of 3 ($M = 3.09$, $SD = .898$, $t = 1.005$, $p = .317$; Table 4.7).

Table 4.7

TEP's eighth Grade Traditional and Year-Round Proficiency Results - One Sample T Test

	n	Test Value = 3					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional eighth grade proficiency results	107	2.913	.627	-1.441	106	.153	-.087	-.207	.033
Year round eighth grade proficiency results	112	3.085	.898	1.005	111	.317	.085	-.083	.253

Therefore, the results support that both the null hypotheses for the traditional and year-round eighth grade cohorts (H_4) are supported with no significant difference in proficiency score from the expected proficiency level of 3, as established by the New York State math assessment.

To further analyze the data, an independent sample t -test was used to test whether there was a significant difference between the eighth grade proficiency scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation; however, the data failed to meet the equal variance assumption using Levene's statistic ($F = 26.604$, $p = .000$). Results revealed a non-significant difference ($t = 1.655$, $p = .099$) between the scores for traditional eighth grade students ($M=2.913$, $SD=.627$) and the year-round eighth grade students ($M=3.085$, $SD=0.898$), as shown in Table 4.8. These results suggested that the year-round and traditional calendar eighth graders fail to show

any significant differences in proficiency when identifying proficiency as a measure for success.

Table 4.8

TEP's eighth Grade Independent Sample T-test - Proficiency Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
eighth grade proficiency	-1.655	198.9	.099	-.173	.104	-.378	.033

Therefore, the results of the independent sample *t*-test failed to reject the null hypotheses (H_4), supporting no statistically significant difference between the traditional calendar eighth grade low SES student cohort and the year-round calendar eighth grade low SES student cohort.

In summary for RQ4, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the eighth grade in terms of mean proficiency on the New York State assessment, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean proficiency ($M = 2.913$) that was lower than the year-round calendar cohort ($M = 3.085$), but this difference was not statistically significant ($p > .05$). Thus, the results fail to reject the null hypothesis (H_4), supporting no significant difference in mean proficiency between cohorts. The results fail to support a positive effect of the year-round calendar reform on math student achievement in the eighth grade population of students from a low-socioeconomic background. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 5. The fifth research question asked: Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using growth as a measure of success? To address this question, math achievement in terms of growth percentiles among fifth grade students first was assessed to see if the student scores were significantly different from TEP's assigned success measure at a value of 70 to identify whether students in both groups (traditional calendar and year-round calendar) obtained successful growth measures. Second, math growth percentile differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₅: There is no difference in achievement in math between fifth grade students who attended TEP under a traditional calendar and fifth grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

TEP's fifth grade growth percentile data results for the traditional calendar low SES cohort during 2009 – 2010 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean growth percentile was significantly lower than the TEP assigned standard value of 70 ($M = 34.54$, $SD = 26.199$, $t = -14.89$, $p = .000$; see Table 4.9), while the results for the year-round calendar low SES cohort during 2014 – 2015 school year showed a higher mean growth percentile score that still was significantly less than the standard value of 70 ($M = 55.393$, $SD = 28.483$, $t = -5.427$, $p = .000$; Table 4.9).

Table 4.9

TEP's fifth Grade Traditional and Year-Round Growth Results - One Sample T Test

	n	Test Value = 70					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional fifth grade growth results	121	34.537	26.199	-14.89	120	.000	-35.463	-40.18	-30.75
Year round fifth grade growth results	112	55.393	28.483	-5.43	111	.000	-14.607	-19.94	-9.27

Therefore, the results support that the null hypotheses for both the traditional fifth grade cohort and the year-round fifth grade cohort (H_0) are rejected, supporting a significantly lower growth percentile from the expected growth percentile level of 70.

To further analyze the data, an independent sample t -test was used to test whether there was a significant difference between the fifth grade growth percentiles scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation and results of the Levene's statistic supported the equal variance assumption ($F = 3.037$, $p = .083$). Results supported a significant difference ($t = -5.822$, $p = .000$) between the growth percentiles for traditional fifth grade students ($M=34.537$, $SD=26.199$) and the year-round fifth grade students ($M=55.393$, $SD=28.483$), as shown in Table 4.10. These results suggested that the year-round calendar fifth graders showed significantly higher growth percentiles than their traditional cohort counterparts.

Table 4.10

TEP's fifth Grade Independent Sample T-test - Growth Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
fifth grade growth percentile	5.822	231	.000	-20.856	3.582	-27.914	-13.774

Therefore, the results of the independent sample *t*-test rejected the null hypothesis(H_5), supporting a statistically significant difference in growth percentiles between the traditional calendar fifth grade low SES student cohort and the year-round calendar fifth grade low SES student cohort, with the year-round group having a significantly higher growth percentile when compared to the traditional group.

In summary for RQ5, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the fifth grade in terms of mean growth percentile, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean proficiency ($M = 34.537$) that was significantly lower than the year-round calendar cohort ($M = 55.3929$). Thus, the null hypothesis (H_5) is rejected, supporting a significant difference in mean growth between cohorts. The significant results support a positive effect of the year-round calendar reform on growth percentiles in the fifth grade population of students from a low-socioeconomic background. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 6. The sixth research question asked: Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using growth as a measure of success? To address this question, math achievement in terms of growth percentiles among sixth grade students first was assessed to see if the student scores were significantly different from TEP's assigned success measure at a value of 70 to identify whether students in both groups (traditional calendar and year-round calendar) obtained successful growth measures. Second, math growth percentile differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₆: There is no difference in achievement in math between sixth grade students who attended TEP under a traditional calendar and sixth grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

TEP's sixth grade growth percentile data results for the traditional calendar low SES cohort during 2010 – 2011 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean growth percentile was significantly lower than the standard value of 70 ($M = 52.31$, $SD = 27.297$, $t = -7.130$, $p = .000$; see Table 4.11), while the results for the year-round calendar low SES cohort during 2015 – 2016 school year showed a higher mean growth percentile score that was significantly higher than the standard value of 70 ($M = 82.386$, $SD = 20.201$, $t = 6546$, $p = .000$; Table 4.11).

Table 4.11

TEP's sixth Grade Traditional and Year-Round Growth Results - One Sample T Test

	n	Test Value = 70					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional sixth grade growth results	121	52.306	27.297	-7.130	120	.000	-17.694	-22.61	-12.78
Year round sixth grade growth results	114	82.39	20.201	6.546	113	.000	12.386	8.638	16.134

Therefore, the results support that the null hypotheses for both the traditional sixth grade cohort and the year-round sixth grade cohort (H_6) are rejected, supporting a significantly lower growth percentile from the expected growth percentile level of 70 for the traditional cohort and a significantly higher growth percentile for the year-round cohort.

To further analyze the data, an independent sample *t*-test was used to test whether there was a significant difference between the sixth grade growth percentiles scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation; however, the results of the Levene's statistic failed to support the equal variance assumption ($F = 24.126, p = .000$). Results supported a significant difference ($t = -9.639, p = .000$) between the growth percentiles for traditional sixth grade students ($M=52.306, SD=27.297$) and the year-round sixth grade students ($M=82.386, SD=20.201$), as shown in Table 4.12. These results suggested that the year-round calendar sixth graders showed significantly higher growth percentiles than their traditional cohort counterparts.

Table 4.12

TEP's sixth Grade Independent Sample T-test - Growth Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
sixth grade growth percentile	-9.639	220.8	.000	-30.08	3.12	-36.23	-23.93

Therefore, the results of the independent sample *t*-test rejected the null hypothesis(H_0), supporting a statistically significant difference in growth percentiles between the traditional calendar sixth grade low SES student cohort and the year-round calendar sixth grade low SES student cohort, with the year-round group having significantly higher growth percentiles when compared to the traditional group.

In summary for RQ6, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the sixth grade in terms of mean growth percentile, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean growth percentile ($M = 52.306$) that was significantly lower than the year-round calendar cohort ($M = 82.386$). Thus, the null hypothesis (H_0) was rejected, supporting a significant difference in mean growth percentiles between cohorts. The significant results support a positive effect of the year-round calendar reform on growth percentiles in the sixth grade population of students from a low-socioeconomic background. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 7. The seventh research question asked: Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using growth as a measure of success? To address this question, math achievement in terms of growth percentiles among seventh grade students first was assessed to see if the student scores were significantly different from TEP's assigned success measure at a value of 70 to identify whether students in both groups (traditional calendar and year-round calendar) obtained successful growth measures. Second, math growth percentile differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₇: There is no difference in achievement in math between seventh grade students who attended TEP under a traditional calendar and seventh grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

TEP's seventh grade growth percentile data results for the traditional calendar low SES cohort during 2011 – 2012 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean growth percentile was significantly higher than the standard value of 70 ($M = 82.00$, $SD = 15.437$, $t = 8.227$, $p = .000$; see Table 4.13), while the results for the year-round calendar low SES cohort during 2016 – 2017 school year showed a lower mean growth percentile score that was significantly lower than the standard value of 70 ($M = 47.324$, $SD = 25.536$, $t = -9.355$, $p = .000$; Table 4.13).

Table 4.13

TEP's seventh Grade Traditional and Year-Round Growth Results - One Sample T Test

	n	Test Value = 70					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional seventh grade growth results	112	82.00	15.437	8.227	111	.000	12.00	9.11	14.8905
Year round seventh grade growth results	111	47.324	25.536	-9.355	110	.000	-22.676	-27.48	-17.87

Therefore, the results support that the null hypotheses for both the traditional seventh grade cohort and the year-round seventh grade cohort (H_7) are rejected, supporting a significantly higher growth percentile from the expected growth percentile level of 70 for the traditional cohort, and a significantly lower growth percentile for the year-round cohort.

To further analyze the data, an independent sample t -test was used to test whether there was a significant difference between the seventh grade growth percentiles scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation; however, the results of the Levene's statistic failed to support the equal variance assumption ($F = 33.570, p = .000$). Results supported a significant difference ($t = 12.258, p = .000$) between the growth percentiles for traditional seventh grade students ($M=82.00, SD=15.437$) and the year-round seventh grade students ($M=47.324, SD=25.536$), as shown in Table 4.14. These results suggested that the traditional calendar seventh graders showed significantly higher growth percentile than their year round cohort counterparts.

Table 4.14

TEP's seventh Grade Independent Sample T-test - Growth Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
seventh grade growth percentile	12.258	180.629	.000	34.6756	2.829	29.09	40.26

Therefore, the results of the independent sample *t*-test rejected the null hypotheses (H_7), supporting a statistically significant difference in growth percentiles between the traditional calendar seventh grade low SES student cohort and the year-round calendar seventh grade low SES student cohort, with the year-round group having a significantly lower growth percentile when compared to the traditional group.

In summary for RQ7, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the seventh grade in terms of mean growth percentile, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean growth percentile ($M = 82.00$) that was significantly higher than the year-round calendar cohort ($M = 47.324$). Thus, the null hypothesis (H_7) was rejected, supporting a significant difference in mean growth between cohorts. However, these significant results fail to support a positive effect of the year-round calendar reform on growth percentiles in the seventh grade population of students from a low-socioeconomic background. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Research Question 8. The eighth research question asked: Is there a difference in math achievement of an eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using growth as a measure of success? To address this question, math achievement in terms of growth percentiles among eighth grade students first was assessed to see if the student scores were significantly different from TEP's assigned success measure at a value of 70 to identify whether students in both groups (traditional calendar and year-round calendar) obtained successful growth measures. Second, math growth percentile differences were analyzed between the two cohort groups to identify whether significance between group differences were evident. Therefore, for this research question, the following hypotheses were tested:

H₈: There is no difference in achievement in math between eighth grade students who attended TEP under a traditional calendar and eighth grade students who attended TEP under a year-round calendar as measured by the growth standards established by New York State's math assessment.

TEP's eighth grade growth percentile data results for the traditional calendar low SES cohort during 2012 – 2013 school year (applying a One Sample *t*-test) showed that the traditional calendar cohort mean growth percentile was significantly higher than the standard value of 70 ($M = 72.39$, $SD = 24.23$, $t = 1.01$, $p = .316$; see Table 4.15), while the results for the year-round calendar low SES cohort during 2017 – 2018 school year showed a lower mean growth percentile score that was significantly lower than the standard value of 70 ($M = 50.68$, $SD = 27.37$, $t = -7.438$, $p = .000$; Table 4.15).

Table 4.15

TEP's eighth Grade Traditional and Year-Round Growth Results - One Sample T Test

	n	Test Value = 70					95% CI of the Difference		
		M	SD	t	df	p	Mean Difference	Lower	Upper
Traditional eighth grade growth results	104	72.394	24.226	1.008	103	.316	2.394	-2.32	7.12
Year round eighth grade growth results	111	50.676	27.371	-7.438	110	.000	-19.324	-24.47	-14.18

Therefore, the results for the traditional eighth grade cohort (H_8) fail to reject the null hypothesis that the growth percentage is significantly different that the expected value of 70, but for the year-round eighth grade cohort (H_8) reject the null hypothesis, supporting a significantly lower growth percentile from the expected growth percentile level of 70.

To further analyze the data, an independent sample *t*-test was used to test whether there was a significant difference between the eighth grade growth percentiles scores of the students in the traditional calendar group (control) compared to those in the year-round calendar group (treatment). Data were normally distributed on graphic representation and the results of the Levene's statistic support the equal variance assumption ($F = 2765$, $p = .098$). Results supported a significant difference ($t = 6.145$, $p = .000$) between the growth percentiles for traditional eighth grade students ($M=73.394$, $SD=24.226$) and the year-round eighth grade students ($M=50.646$, $SD=27.371$), as shown in Table 4.16. These results suggested that the traditional calendar eighth graders showed significantly higher growth percentile than their year-round cohort counterparts.

Table 4.16

TEP's eighth Grade Independent Sample T-test - Growth Results

	t	df	p	Mean difference	SE of the difference	95% CI	
						Lower	Upper
eighth grade Growth percentile	6.125	213	.000	27.719	3.534	14.75	28.69

Therefore, the results of the independent sample *t*-test rejected the null hypothesis(H_0), supporting a statistically significant difference in growth percentile between the traditional calendar eighth grade low SES student cohort and the year-round calendar eighth grade low SES student cohort, with the year-round group having a significantly lower growth percentile when compared to the traditional group.

In summary for RQ8, the purpose of the *t*-test was to test for significant difference between the traditional calendar and the year-round calendar cohorts in the eighth grade in terms of mean growth percentile, which would identify a relationship between the variables. The one sample *t*-test indicated that the traditional calendar cohort had a mean growth percentile ($M = 72.39$) that was significantly higher than the year-round calendar cohort ($M = 50.68$). Thus, the null hypothesis (H_0) was rejected, supporting a significant difference in mean growth between cohorts. However, these significant results fail to support a positive effect of the year-round calendar reform on growth percentiles in the eighth grade population of students from a low-socioeconomic background. It is important to note that New York State fully adopted the common core standards in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not as rigorous as the cohort who followed the year-round model.

Summary of Results

The findings support the hypothesis of the research study, year-round education has a positive impact on student achievement in math at The Equity Project charter school when compared to a traditional calendar for students of a low socioeconomic status when using proficiency and growth as a measure of student success on the New York State math assessment but with important exceptions and qualifications. In summarizing results for the fifth and sixth grade cohorts attending under a year-round calendar, significant and positive impact was determined using proficiency and growth as a measure of success. In summarizing results for the seventh and eighth grade cohorts attending under a year-round calendar, the results were mixed. Employing a One Sample t-test and Independent t-test the researcher determined the significant difference between year-round education compared to traditional education when using proficiency and growth as a measure of success.

Results for the fifth grade cohorts showed both groups to fall below proficiency and also showed a statistically significant difference between the proficiency scores for traditional fifth grade students and the year-round fifth grade students; however, these results failed to support the positive effects of year-round education with the traditional students scoring higher than the year-round students. Among fifth grade students, both the traditional calendar group and the year-round calendar group demonstrated significantly lower growth percentiles than the expected 70; however, the two groups showed a significant difference in growth percentiles with year-round calendar fifth graders showing significantly higher growth percentile than their traditional cohort counterparts.

Results for the sixth grade cohort supported significantly higher proficiency scores for the year-round cohort, while the traditional calendar cohort demonstrated significantly lower proficiency scores. Further, the results showed a statistically significant difference between the traditional calendar sixth grade cohort and the year-round calendar sixth grade cohort, with the year-round group scoring higher and within the defined proficiency level, compared to the traditional group. The significant results support a positive impact of year-round calendar reform on math student achievement in the sixth grade population of students from a low-socioeconomic background. Among the sixth grade population, the traditional calendar cohort demonstrated significantly lower growth percentile from the standard of 70, while the year-round cohort demonstrated significantly higher growth percentile from the standard. Results also supported a significant difference between the growth percentiles for traditional sixth grade students and the year-round sixth grade students with the year-round calendar sixth graders showing significantly higher growth percentile than their traditional cohort counterparts, supporting a positive effect of the year-round calendar reform on growth percentiles in the sixth grade population of students from a low-socioeconomic background.

When determining if year-round education has a positive impact on student achievement in math using a One Sample t-test and Independent t-test the results supported statistically significant gains for three out of four tests conducted. The results suggest fifth and sixth grade cohorts entering TEP middle school under a year-round calendar will likely to have an academic advantage when compared to students entering TEP middle school under a traditional school calendar.

Results for the seventh grade supported significantly greater proficiency than expected among the traditional calendar cohort, however the results were lower than the standard proficiency levels for the year-round cohort. Outcomes supported a significant difference between the scores for traditional seventh grade students and the year-round seventh grade students. These results suggested that the year-round calendar seventh graders show significantly lower proficiency than their traditional counterparts and therefore fail to support a positive effect of year-round calendar reform on student proficiency scores. The traditional calendar cohort growth percentiles are significantly higher than the standard value of 70, while the results for the year-round calendar cohort showed lower growth percentile scores that are significantly lower than the standard value of 70. Results support a significant difference between the growth percentiles for traditional seventh grade students and the year-round seventh grade students, supporting significantly higher growth percentiles among the traditional group of seventh graders than their year-round counterparts, failing to support a positive effect of the year-round calendar reform on growth percentiles in the seventh grade population of students from a low-socioeconomic background.

Results for eighth grade students, both the traditional calendar cohort and the year-round calendar cohort demonstrated proficiency, with no significant differences between the two groups. The traditional calendar cohort growth percentiles are significantly higher than the standard value, while the year-round calendar cohort showed lower growth percentile scores that are significantly lower than the standard value of 70. Further, results supported a significant difference between the growth of the groups, which supported that the traditional calendar eighth graders showed significantly higher

growth percentiles than their year-round cohort counterparts, failing to support a positive effect of the year-round calendar reform on growth percentiles in the eighth grade population of students from a low-socioeconomic background.

When determining if year-round education has a positive impact on student achievement in math using a One Sample *t*-test and Independent *t*-test the results were mixed, partially supporting year-round education in seventh and eighth grade. One out of four tests conducted supported statistically significant gains. The results suggest seventh and eighth grade cohorts at TEP middle school under a year-round calendar will likely not have an academic advantage when compared to students at TEP middle school under a traditional school calendar.

It is important to note that common core standards were approved for the 2009 – 2010 state assessment but New York State did not fully implement the common core standards until 2014 (Kober et al., 2012). Common core standards were significantly more rigorous than the previous New York State standards (Kober et al., 2012). The rigor of the common core standards as it relates to the New York State standards is a variable that needs to be identified when looking at the results of the *t*-tests. Therefore, a limitation of the study that must be addressed is the full adoption of the common core state standards by New York State in 2014; this limitation suggests that the traditional calendar cohort measured math achievement with standards that were less rigorous than the year-round calendar cohort. Although the results did not show significance on all *t*-tests, results approaching significance showed that the students who received year-round calendar reform had a greater impact on student achievement than the traditional calendar cohort. A detailed summary and discussion of the findings are presented in Chapter 5.

Chapter 5: Discussion

Introduction

The purpose of this retrospective study was to compare the test results of a cohort of middle school students who attended TEP charter school when it followed a traditional school calendar to the test results of a cohort of middle school students who attended the same school when it followed a year-round, 12-month calendar. These results can help educators understand the impact of a study that also attempted to fill a void in the research, specifically in the area of middle school math achievement.

This study analyzed the academic achievement and growth of students from low socioeconomic backgrounds. The importance of this study was supported by research indicating that economically disadvantaged students generally exhibit lower levels of academic achievement than their more economically advantaged counterparts, and that efforts to address the academic underperformance of this population are often ineffective (Alexander et al., 2007; Evans, 2007). Research also has suggested that students from low socioeconomic backgrounds make less academic progress during the summer months than students from more affluent families (Alexander et al., 2007; Allington et al., 2010). This study addressed a gap in the research relative to middle school math proficiency and growth as a measure of success.

This study contributes to the body of knowledge surrounding year-round calendars and the associated impact on the academic performance of students from low socioeconomic backgrounds. The results of this study can be used by educational

stakeholders, such as school and district leaders, parents, and community members.

These results add to the knowledge surrounding school calendar reform and whether it can, in combination with other educational reforms, improve the academic achievement of students from low socioeconomic backgrounds.

To examine the impact of year-round education on math achievement of students from low socioeconomic backgrounds at The Equity Project charter school, a quasi-experimental study was conducted to test whether statistically significant difference exists in student math results at a school using a year-round middle school calendar compared to a school using a traditional middle school calendar. The primary source of data collection was archival data. All statistical analyses were completed using the Statistical Package for the Social Sciences (SPSS) version 25.0.

A one sample *t*-test and an independent samples *t*-test were conducted to answer eight research questions, by testing each hypothesis, determining whether there was a statistically significant difference in year-round calendar education compared to traditional calendar education, relative to student proficiency and growth.

The participants in this study enrolled in TEP in 2009 and 2014. These student cohorts were selected for participation because the 2009 cohort experienced 4 years of traditional education, while the 2014 cohort experienced 4 years of year-round education. Using a quantitative methodology, this study analyzed differences between middle school students' New York State math assessment scores, specifically, average proficiency ratings and median growth percentiles, for the 2009-2010 cohort and the 2014-2015 cohort, to answer the following research questions:

RQ1. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ2. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ3. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ4. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using proficiency as a measure of success?

RQ5. Is there a difference in math achievement of a fifth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of fifth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ6. Is there a difference in math achievement of a sixth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of sixth grade

students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ7. Is there a difference in math achievement of a seventh grade cohort of students attending TEP under a traditional school calendar compared to a cohort of seventh grade students attending TEP under a year-round calendar, when using growth as a measure of success?

RQ8. Is there a difference in math achievement of a eighth grade cohort of students attending TEP under a traditional school calendar compared to a cohort of eighth grade students attending TEP under a year-round calendar, when using growth as a measure of success?

Implications of Findings

Higher standards of accountability such as the Common Core State Standards have challenged educators to find ways to help economically disadvantaged students meet these benchmarks. As school districts look for new ways to improve student achievement, calendar reform is an intervention that deserves consideration, especially given the results of this study for students of low socioeconomic status. Although this study specifically focused on a sample of low socioeconomic status students at The Equity Project charter school, the results may enhance the current understanding of school calendars and effective educational strategies for all students from low socioeconomic backgrounds.

As indicated earlier in this chapter, the results of this study revealed a significant difference in the academic achievement, and when using proficiency as a measure of success, experienced by students of low socioeconomic background in sixth, seventh, and

eighth grades at The Equity Project charter school, when given year-round education as an intervention and when proficiency is used as a measure of success. The results also revealed that there is a significant difference in the academic achievement, when using growth as a measure of success, experienced by students of low socioeconomic background in fifth and sixth grades at The Equity Project charter school, when given year-round education as an intervention and when growth is used as a measure of success. The results indicated that calendar reform is likely to support academic performance in schools with large populations of low socioeconomic status students. The school calendar, in isolation, may not be a factor that is likely to influence students' academic success, but these results support school calendar as a significant factor in combination with other variables that together contribute to student achievement.

Theoretical implications. The phenomenon known as spacing effect, an application of early learning theory, provided the theoretical foundation for this study. Spacing effect is based on the understanding that allowing time or space between learning events is more likely to result in long term information retention than repeated, intense studying over a short period of time (Carpenter et al., 2012). This study is related to the spacing effect because it investigates the reorganization of instructional time at The Equity Project charter school. The influence of calendar reform on academic achievement speaks to the effective management of time in an educational setting, which is consistent with the theory of spacing effect.

Using the lens of spacing effect, these results suggest that year-round schooling, when it is first introduced as an intervention, may not have an effect on proficiency. However, once students adjust to the structure and move up to higher grades, the year-

round model can have a statistically significant impact on proficiency results. The results also imply that spacing effect is applicable to student growth as a measure of academic achievement when first introduced as an intervention; however, the results also suggest that the impact of the intervention in terms of growth reaches a threshold in the upper middle school years around seventh grade. Research on the impact of spacing effect on children in an educational setting is limited, and research that focuses specifically on low socioeconomic status students at the middle school level is nonexistent (Miles, 2010; Roediger et al., 2010). More research is needed in order to determine whether spacing effect can be generalized and applied to unstudied populations (Roediger et al., 2010; Vlach & Sandhofer, 2012).

Practical implications. This study was unique in that it focused on whether one element of the educational environment could influence academic achievement of a specific population of students. Focusing on a population of low socioeconomic status students allowed the researcher to address important educational issues, including the socioeconomic achievement gap and accountability. The Equity Project charter school is an institution that provided both a traditional calendar setting and a year-round calendar setting over an 8-year period. The student population during this period had many similarities in terms of demographics, school setting, economic classification, and instructional style. The findings of the study are strengthened by these similarities and, as a result, can provide insight with regard to the influence of calendar reform on academic achievement. The quantitative methodology employed in the study and the use of existing archival data produced statistically strong and reliable results.

School districts serving large populations of low socioeconomic status students should consider calendar reform as an intervention that promotes student achievement. It is important to consider the influence of all factors in the educational environment in order to determine the possible benefits or detriments of each one. This process will enable educational leaders to design school environments that employ best practices and commit to the continuous improvement of the academic experience of students from low socioeconomic backgrounds.

Future implications. The results of this study suggest a need for future research into other factors that could influence students' academic success. Calendar reform was found to be a factor in academic achievement at The Equity Project charter school for three out of four grades when identifying proficiency as a measure of success, and two out of four grades when identifying growth as a measure of success. Isolating the many factors that influence academic achievement could benefit educational stakeholders attempting to develop an environment that is conducive to student success.

The results of this study also suggest a need for additional research that investigates the influence of school calendars on a larger economically disadvantaged student population. Understanding the influence of calendar reform on students from these populations may help to address their educational needs and improve the quality of their academic experiences.

Educational decision-makers can use the results of this study to guide decisions regarding calendar reform in schools with large populations of students from low socioeconomic backgrounds. School administrators and members of school governing boards can use the results of this study to help implement and fund calendar reform as a

factor that can influence academic achievement in schools with large populations of low socioeconomic status students. This study should encourage educational decision-makers to identify the influence of not only calendar reform, but also other factors identified in current research on school environments that may influence academic achievement.

The researcher has a responsibility to mention impediments to implementing year-round calendar reform. Administrators, governing boards, and other decision makers need to acknowledge barriers that would hinder the successful implementation of year-round schooling, such as employee unions in the public sector, parental and cultural resistance to breaking up summer recess, and summer camp cultures that are only sustainable because of traditional 10-month school calendars. These difficulties are acknowledged and noted by the researcher. The researcher must also mention the potential for research bias as a math teacher at TEP charter school. It would be unethical not to acknowledge that role.

Limitations

The results of this study must be examined with an understanding of its limitations. First, this study only compared cohorts from one educational institution, The Equity Project charter school. The population in this study was two cohorts of approximately 250 students, which represents a small sample size.

The second limitation to this study is the impact on instruction of the transition from New York State standards to Common Core state standards. This limitation may have had a significant effect on the results of the study because New York state did not fully adopt the Common Core state standards until the school year beginning in 2014 (Kober et al., 2012), so the traditional calendar cohort tested with standards that were not

as rigorous as the cohort that followed the year-round model. In the first year of implementation of these more rigorous standards and exams, New York City math proficiency percentages for middle school students dropped from 81.5% to 53.6%, a decrease of 27.9% (NYSED:IRS, n.d). After New York State fully adopted Common Core Standards, math proficiency dropped from 59.8% to 29.7%, an additional decrease of 30.1%. This is an overall decrease of 51.8% math proficiency at the middle school level (NYSED:IRS, n.d). This limitation suggests that any results that exceeded statistical significance by year-round calendar reform or any results approaching statistical significance by year-round calendar reform be viewed anecdotally as very significant when compared to traditional calendar results at The Equity Project charter school.

Additionally, the researcher was compelled to look at data on the district, city and state level to see if year-round education has an impact on student achievement independent of the study at The Equity Project charter middle school. This would allow a glimpse into comparing traditional education and year-round education using math state assessment data when standards are aligned. Data on student proficiency was compared over a 4-year period when TEP experienced year-round education from school year 2014-15 to school year 2017-18, this is representative of the same year-round cohort identified in the study. It is important to note that data is limited and other factors could have an impact on student achievement. It is also important to note that the demographics start out similar at the district level then begin to get less similar at the city level and dissimilar at the state level. When comparing TEP middle school student proficiency data to District 6 student proficiency data from fifth to eighth grade over a period of 4 years from 2014-15 to 2017-18, on average TEP had 21% more proficient students than District 6 middle

school students(NYSED:IRS, n.d). When comparing TEP middle school student proficiency data to New York City student proficiency data from fifth to eighth grade over a period of 4 years from 2014-15 to 2017-18 on average TEP had 10% more proficient students than New York City middle school students (NYSED:IRS, n.d). When comparing TEP middle school student proficiency data to New York State student proficiency data from fifth to eighth grade over a period of 4 years from 2014-15 to 2017-18 on average TEP had 3% more proficient students than New York State middle school students (NYSED:IRS, n.d). These findings only measure student proficiency data however; the limited results suggest that year-round education has an overwhelming positive impact on student achievement.

Another limitation to this study was that it focused on students from low socioeconomic backgrounds. Although this subgroup made up a large majority of the population of students in these two cohorts, the results were not disaggregated to show the difference in student results between low-SES students and students not from low-SES. Therefore, these data represent all students from both cohorts acknowledging that anywhere from 5% to 10% of the students were not low-SES students.

The fourth limitation to this study was that it focused on fifth through eighth grade students in math achievement. As such, elementary grade students and high school students were not included in the study. It is beyond the purview of this study to say whether year-round education is effective in elementary or high school. It is also difficult to say whether year-round education is effective in subject areas like English Language Arts, science, or social studies at The Equity Project charter school with calendar reform as an intervention.

The final limitation of this research relates to factors and variables that could affect student achievement, but were not controlled for in the study. These factors can include parent involvement, nutrition, family background, and possible medical issues students may have. Additional factors and variables not controlled by this methodology that could have influenced the academic achievement of students include: class size, teacher quality, teacher turnover, and transitioning curriculum (Borg et al., 2012). As stated previously, transitioning curriculum could have had a significant impact on the results because New York State was transitioning from New York State standards to Common Core State standards at the same time The Equity Project transitioned from traditional education to year-round education. The Common Core State standards are designed to be rigorous, robust, and relevant to the real world, reflecting the knowledge and skills that our scholars need for success in college and careers. Unfortunately, this study was not able to control the influence of these factors on the results of the study. In order to maintain student anonymity the researcher focused on publically available assessment results of grade level cohorts within The Equity Project charter school, rather than individual students.

Recommendations

For various reasons, many school districts and educators often ponder whether calendar reform can benefit students academically. With little research available confirming that a continuous calendar is likely to help students succeed academically, additional research needs to be done with regard to this topic. One type of study on calendar reform is not necessarily the answer; rather, studies focusing on many facets of

calendar reform could help create a clearer picture of the pros and cons such school schedules may offer students.

Recommendation for future study. Sabatino et al. (2013) mentioned that future studies should examine more schools that have made the decision to extend their calendars to verify findings, even though their study did not show statistically significant differences in all results attributed to calendar reform. Therefore, future studies still need to be conducted on whether calendar reform may help low-SES students academically. The following are some further recommendations for future research in relation to this study.

This study focused on one academic institution, The Equity Project charter school. This charter school resides within a large urban public school district that has 24 middle schools. Five of these are charter schools, while the other 19 are public schools. Of these schools, only The Equity Project charter school follows a year-round calendar model. Therefore, further research can be done to compare The Equity Project charter school to all traditional calendar schools in District 6 to see if there is a significant difference in student achievement in math for students of low socioeconomic status. Future research can also be done to compare The Equity Project charter school to all traditional calendar charter schools in District 6 to see if there is a significant difference in student achievement in math for students of low socioeconomic status.

This study presented an unintended complication as a result of New York State delaying the transition from New York State standards to Common Core state standards in 2014. Each cohort experienced curriculum and state assessments that were not equally aligned with the corresponding levels of rigor. In the first year of implementation of these

more rigorous standards and exams, New York City math proficiency percentages dropped from 81.5% to 53.6%, a decrease of 27.9% (NYSED:IRS, n.d). After New York State fully adopted Common Core Standards, NYC math proficiency dropped from 59.8% to 29.7%, an additional decrease of 30.1%. This is an overall decrease of 51.8% math proficiency (NYSED:IRS, n.d). Therefore, future research can be done with two academic institutions that are academically aligned with the same state standards.

Finally, it would be important to consider a qualitative study to determine opinions and perceptions people have who are involved with calendar reform schools. Such a study should include the perspective of students, parents, school faculty, and district administrators involved with calendar reform.

Recommendations for practice. The results of this study indicated that calendar reform has an impact on student achievement. In addition, proficiency, as a measure of success for students, improved in the subsequent years following the initial introduction to year-round education as an intervention. Growth, as a measure of success, when comparing year-round education to traditional education for students of a low socioeconomic status in the beginning grades in middle school, also has a positive impact on student achievement when students are exposed to calendar reform. This could suggest that calendar reform as an intervention has a threshold for success in terms of growth the longer a student attends a school with a year-round calendar.

Conclusion

At the heart of this study was a desire to learn whether calendar reform has an impact on student achievement for students from low socioeconomic backgrounds. The researcher was particularly interested in low socioeconomic status students because of his

personal and professional background and the significant number of students, families, and communities struggling in our nation's public school system.

According to the key findings related to year-round education and student achievement, several important lessons were learned. Students who are at an economic disadvantage realize fewer gains in proficiency than students from affluent communities (Evans, 2007). As a result, how we measure success on state assessments is inherently discriminatory against high need students. Measuring student growth as opposed to only proficiency will provide administrators, governing boards, and other decision makers the needed data to properly evaluate if calendar reform has a positive impact on student achievement. Measuring proficiency alone would not determine whether student gains were met when studying students of low socioeconomic status as the target population.

Zeke Vanderhoek, founder of The Equity Project charter school, amended its charter to include calendar reform as part of the charter for the 2013-2014 school year. According to Vanderhoek, the reason the decision was made to implement calendar reform was, simply put, the belief that the 10-week summer break is too long for the majority of students and negatively affects their learning outcomes. We call this the *summer slide*. The summer slide refers to the fact that disadvantaged students often lose significant academic ground over the summer; their skill level typically decreases during the long summer vacation. At the same time, the achievement gap widens between disadvantaged students and their more advantaged peers, who typically attend some type of summer enrichment program (academic, artistic, athletic, etc.). Academic research as well as interviews (conducted by TEP) with numerous school leaders at schools that have

implemented a shorter-summer break, strongly support the view that student outcomes improve when summer learning opportunities are available.

Summer learning loss indicates that students of low-socioeconomic status are more likely to be impacted by time away from school than their economically advantaged peers (Evans, 2007). This research suggests that attending year-round schools could potentially reduce the negative affect of summer learning loss on students from low-socioeconomic backgrounds who commonly experience little or no learning or enrichment opportunities during the summer months (Evans, 2007). On the strength of this research alone, one must ask why year-round education is not being implemented in more schools, particularly schools with large socioeconomically disadvantaged children.

This was a quantitative study on the impact of calendar reform on student achievement in math at The Equity Project charter school for students of low socioeconomic backgrounds. To analyze the data, an independent t-test and a one sample t-test were used to compare the achievement and progress of two student cohorts at TEP, one in which the students received only a traditional school calendar and one in which the students received only a year-round school calendar. This research helped identify whether improved academic growth is occurring in the math in the year-round calendar setting at TEP, compared to a control group having a traditional calendar setting.

This study and the associated results are significant for any school or school district that is considering whether year-round education will improve student outcomes and educational opportunities. This study is also significant for administrators who are considering school calendar reform in an effort to improve the academic success of students from low socioeconomic backgrounds, and thereby help to close the

achievement gap. These results are also significant for those schools and districts that have been utilizing a year-round calendar, as questions continue to be raised regarding the efficacy of such a costly and sometimes controversial school reform.

Overall, this study shows that work remains to be done in order to validate calendar reform as an effective intervention when attempting to close the achievement gap. Although the findings showed a positive impact for year-round education, the impact was not overwhelmingly significant. In addition, an important limitation regarding the alignment of state standards created a context in which the study was essentially comparing *apples to oranges*. Since difficult standards were presented during the years when calendar reform was implemented, the study would benefit from future research where the enhanced standards were in force over the entire period of the research. These studies can only benefit students from low socioeconomic backgrounds as educators continue their efforts to close the achievement gap. As an executive leader, practitioner, and defender of social justice, it is the responsibility of the researcher to acknowledge the social, economic, and achievement gaps in our public education system. The researcher is optimistic that this study brings awareness to how calendar reform and using growth as a measure for success can begin to give low socioeconomic status students an advantage their economically advantaged counterparts experience throughout the full extent of their academic lives.

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Appendix

Letter of Support from The Equity Project Charter School



CHARTER SCHOOL

The Equity Project (TEP) Charter School
549 Audubon Avenue, Trailer 30
New York, New York, 10040

Telephone 646 254 6451
Facsimile 212 202 3584
www.tepcharter.org

Institutional Support Letter

To St. John Fisher College IRB:

I am familiar with Jason Skeeter's research project entitled "The Effect of Year-Round Education on Middle School Student Achievement in Math: A Program Treatment within The Equity Project Charter School". I understand The Equity Projects involvement will allow Mr. Skeeter access in providing archival data from New York State Math assessment results.

I understand that this research will be carried out following sound ethical principles and this research study provides confidentiality of research data, as described in the protocol.

Therefore, as a representative of The Equity Project Charter School, I agree that Jason Skeeter's research project may be conducted at our institution.

Sincerely,

A handwritten signature in black ink that reads "Zeke Vanderhoek". The signature is written in a cursive style.

Zeke Vanderhoek Founder and Principal of The Equity Project Charter School