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Academic achievement of year-round and traditional calendar elementary students in a school-within-a-school setting

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Academic achievement of year-round and traditional calendar elementary students in a school-within-a-school setting

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For the Major Program

Dedicated to

my support, my strength, my love, my family.

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ABSTRACT

Do students attending school on a year-round calendar outperform students attending school on a traditional calendar in reading and math? Mixed and inconclusive findings are reported in previous studies. This study examined the reading and math achievement of 2004-2005 fifth graders in three school-within-a-school year-round elementary schools located in the United States. An ex post facto comparison group posttest design was utilized. National percentile ranks on state selected standardized tests were analyzed. Overall, sixteen comparisons of year-round and traditional student achievement and growth were made. When mean scores were compared in reading and math achievement and growth, all four comparisons favored year-round education. Only one of these four differences, fifth grade national percentile rank, was statistically significant. When student level variables were controlled, four reading comparisons were not statistically significant. However, all four math comparisons were statistically significant when student level variables were controlled. This study found that year-round calendar students statistically outperform traditional calendar students in a school-within-a-school setting in mathematics.

CHAPTER 1

INTRODUCTION

Structural Systematic School Reform

How can I help Sarah better understand percentages? What new teaching strategies should I use to help our elementary school meet its goal that every child will demonstrate at least one year of growth on the Iowa Test of Basic Skills? Will our school be on the "watch list" from No Child Left Behind (NCLB) legislation? Academic achievement is important to educators at a personal, local, state, and national level. Administrators want each student to develop academically to the fullest potential. Educational leaders set goals for improved academic achievement and work diligently to attain those goals. In addition, building leaders carefully monitor their progress toward goals set by NCLB. At the state level, administrators strive to meet state standards and monitor their rankings in state-by-state comparisons. On the national level, government leaders want to produce scholars that can compete in a global market place and boost our national economy. In an effort to influence academic achievement at multiple levels, educational leaders design and implement programs and policies around identified factors that impact academic achievement.

Time

One factor that impacts academic achievement is time (Copple, Kane, Levin, & Cohen, 1992; Fredrick & Walberg, 1980; Walberg, 1988). The National Education Commission on Time and Learning (1994) identified time as the missing element in the school reform debate. Time is one of nine factors identified that increase learning (Walberg, 1988), and so it is necessary to include time in a theory of educational productivity (Fredrick & Walberg, 1980). *A Nation at Risk* sparked an interest in the relationship of time and

learning (Copple et al., 1992). *A Nation at Risk* (United States Department of Education, 1983) questioned the ability of schools to keep pace with our counterparts in other countries. Numerous studies designate time as a reason that America lags behind their international counterparts in education (Aronson, 1995). Schools may alter teaching time by beginning class promptly, minimizing classroom disruptions, increasing attendance, communicating behavior expectations, preparing materials in advance, and modifying the school day or year (Stuck & White, 1992). Adopting a year-round calendar is one way to modify the school year and restructure time in an effort to boost academic achievement (Aronson, 1995; Copple et al., 1992).

The Traditional Calendar

Today most schools in the United States operate on a traditional calendar and close for several months of the year. However, this has not always been the case. Gold (2002) reports that in the 19th century rural and urban schools held summer and winter sessions and closed in the fall and spring due to poor road conditions and financial constraints. As rural road conditions improved, cities grew, and budgets increased, the school year lengthened. By 1890, schools excluded July and August from the calendar, believing school conditions in the summer were inferior, teachers would benefit from summer professional development, and the human mind and body were too frail for year-round academics. School calendars were regularized by the last quarter of the 19th century. Gold states that "once the 180-day, September to June school calendar became the norm, any attempt to alter significantly the duration of the school year contended with the powerful position of summer vacation in the nation's culture, economy, and historical memory." Today, some argue that schools continue

to operate on a traditional calendar and close for several months in the summer not for educational reasons, but because of cultural, economic and historical traditions.

The Year-round Calendar

While the traditional calendar has been the norm, year-round schooling is alluded to as early as 1645 in the Dorchester school rules. These rules provided that for seven months in the warmer part of the year the master should begin to teach at seven o'clock in the morning and dismiss the scholars at five in the afternoon, while in the colder and darker months of the remainder of the year he was to begin at eight and close at four (Johnson, 1963). By the 1870s, documents indicate the beginning of summer or vacation schools. The records of the early 1900s describe year-round programs in a variety of communities including Newark, New Jersey in 1912; Minot, North Dakota in 1917; Omaha, Nebraska in 1924; Nashville, Tennessee in 1925; and Aliquippa and Ambridge, Pennsylvania in 1928. These year-round programs were begun for a variety of reasons: Newark to help immigrants learn English and enable students to accelerate; Bluffton to improve learning and create additional classrooms; Minot to meet the needs of "laggards"; Aliquippa and Ambridge for space; Omaha to offer continuous vocational training; and Nashville to improve the quality of education (Glines, 1996).

The exploration and implementation of year-round education has been evident in recent history as well. During the 1960s, interest in multi-track year-round education grew as districts looked for solutions to space problems. After exploration, many districts chose either not to adopt the program, or implemented multi-track year-round schedules to ease overcrowding until a bond issue could be passed to provide further building space. In the 1970s, the use of year-round schedules saw tremendous growth and was on the verge of

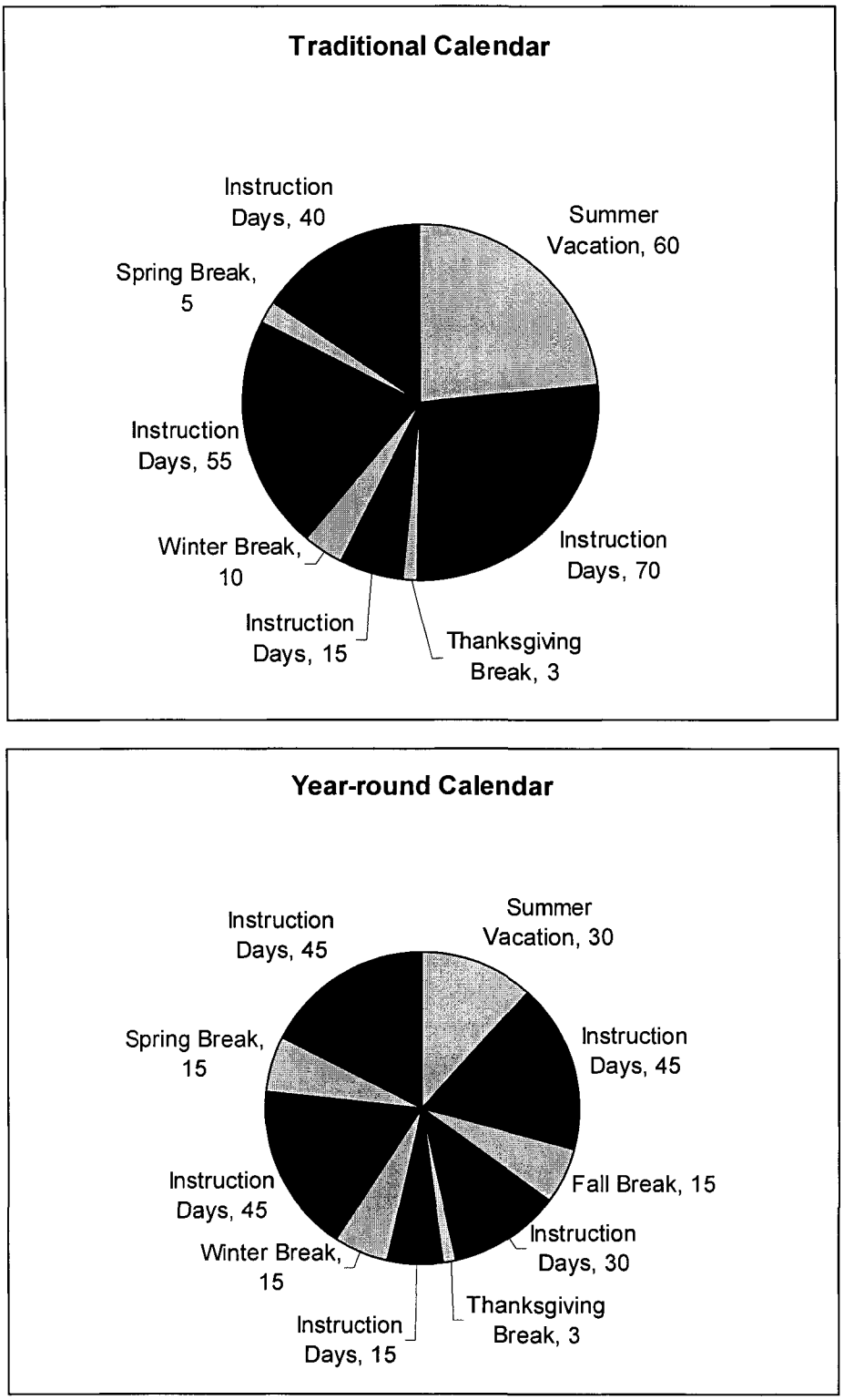
explosion, especially in the state of California. Interest in year-round schedules waned in the 1980s, but saw a re-birth in the 1990s (Glines, 1995).

Today, the interest in year-round schooling continues. The term "year-round education" leads many to envision children at their desks for 52 weeks with no breaks (Association of California Administrators, 1988). However, this is not the case. Currently, year-round education is defined as continuous learning with a shorter summer vacation and more frequent breaks during the period of instruction over the same 180 days of the traditional calendar (National Association for Year-round Education, 2004b). Students attend school for the same number of days, but the days are spread more evenly throughout a calendar year (see Figure 1.1). The traditional, long summer break is shortened and more frequent breaks are added. For this reason many believe that "balanced calendar" or "modified calendar" more accurately reflects this non-traditional calendar than the phrase year-round education. The phrase "extended school year" is occasionally heard, but this concept relates to adding days to the calendar, perhaps a total of 200 as opposed to the present 180 days (Association of California Administrators, 1988). Extended school year calendars are not considered in this study. According to the National Association for Year-round Education (2004c), during the 2003-04 school year, 3,181 schools in 46 states, served over 2.3 million students on a year-round calendar. From 1986 to 2005, there has been a 500% increase in the number of schools offering a year-round calendar.

The Structure of Year-round Education

Year-round education, one method of restructuring time to increase academic achievement (Aronson, 1995; Copple et al., 1992), can take on many forms (see Figure 1.2). Multi-track year-round schools divide students and teachers into groups, or tracks, of

Figure1.1. Comparison of traditional and year-round calendars.



Adapted: (National Association for Year-round Education, 2005)

Figure 1.2. Comparison of traditional, single-track year-round, four-track year-round, and school-within-a-school year-round calendars.

Traditional Calendar

SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
									V	V	V

Single Track Year-round 60-20 Calendar

SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
		V				V				V	

Four Track Year-round 60-20 Calendar

	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
A	V				V				V			
B		V				V				V		
C			V				V				V	
D				V				V				V

School-Within-a-School Calendar with Year-round 60-20

	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
Trad.										V	V	V
YRE			V				V				V	

Key:

Instruction

Vacation V

Adapted: (Brekke, 1992)

approximately the same size. Each track is assigned its own schedule. Teachers and students assigned to a particular track are in school and on vacation at the same time. Multi-track year-round schools are used primarily to alleviate crowding. Implementing a four-track year-round calendar, for example, extends the capacity of a school by 33%. A school with the capacity for 750 students can accommodate 1,000 students, as only three tracks of 250 would

be in school at any given time, while the fourth track would be on vacation. In single-track year-round schools, all students and school personnel follow the same instructional and vacation schedule. Single-track does not reduce class size, nor does it allow a school to accommodate more students (National Association for Year-round Education, 2004b).

Continuous learning with shorter breaks can be configured in a variety of ways. The most popular year-round calendar is the 45-15 plan that has 4, 9 week quarters separated by a 3 week vacation. Another plan, the 60-20, calls for 60 days of instruction followed by 20 days of vacation. Fewer schools use the 90-30 plan with 30 days of vacation after 90 days of instruction (National Association for Year-round Education, 2004b).

During some or all of the vacations, most year-round schools offer intersessions which are mandatory or optional supplementary programs for remediation and enrichment. These programs may be offered free of charge or may be fee-based (Shields & Oberg, 2000). Intersessions can be taught by year-round teachers or other qualified staff (Glines, 1995). Intersessions offer the opportunity for more frequent remediation. On a traditional calendar, many students wait an entire school year to participate in summer school. On the year-round calendar, intersessions are offered more frequently; therefore remediation can occur throughout the school year (Curry, Washington, & Zyskowski, 1997). Intersessions often provide the convenience of riding the bus to remediation sessions which is not typically available during summer school (Nandang, 1997).

School-within-a-school year-round calendars.

Rarely schools offer both a traditional and year-round calendar within a single school building, referred to as a school-within-a-school schedule (Mutchler, 1996). A portion of the student body and their teachers attend school on a traditional calendar, taking a lengthy

summer vacation. The remainder of the student body and their teachers attend school on a year-round calendar, with shorter and more frequent breaks. Depending upon the time of year, all students and teachers may be in session, one calendar may be in session, or all students and teachers may be on break. A few weeks of common vacation in the summer allows for building maintenance that may not be possible with teachers or students present in the building or for families with students on multiple calendars to have a shared vacation (Association of California Administrators, 1988). Typically, school-within-a-school year-round programs are led by one administrator, teach the same curriculum to students on both calendars, operate within a single school culture, and students attend school for the same number of days. While this structure is not common, it creates a unique opportunity for research by holding these variables constant when comparing year-round and traditional students. Year-round schools operate in a variety of structures and are implemented for a variety of reasons.

Philosophical Rationale for Year-round Education

The philosophical rationale for moving to a year-round calendar varies by school district. Some districts want to provide more continuous learning for their students. Others recognize the diversity of lifestyles today and that not everyone is able to vacation in the summer months. Schools also adopt a year-round calendar because there is simply no space to house all learners. Year-round education can also be a catalyst for school improvement. This non-traditional calendar has also been adopted to lessen the pressure on local police forces during the summer months or to provide services to needy students throughout the entire calendar year. Year-round education is often implemented to simply offer families choice in education (Glines, 1995). Schools also expect transforming the school calendar to

provide a higher quality of education and at least moderate improvements in academic achievement (Cook, 2005; McMillen, 2001).

Problem

Today schools are adopting year-round calendars at an increasingly fast pace (National Association for Year-round Education, 2004) with the expectation of boosting academic achievement (Cook, 2005; McMillen, 2001). Is this a realistic expectation that is supported by research? Does year-round education improve academic achievement? Past research has yielded mixed results (Shields & Oberg, 2000; Worthen & Zsiray, 1994). Some studies report positive, but modest gains in academic achievement (Alcorn, 1992; Cooper, Valentine, Charlton, & Melson, 2003; Curry et al., 1997; Haenn, 1996; Kneese, 2000; Palmer & Bemis, 1999; Roby, 1995) while others report no difference (Dossett & Munoz, 2000; Fardig, 1992; McMillen, 2001; Palmer & Bemis, 1999; Penta, 2001; Serow, 1992; Van Mondfrans, 1985; Worthen & Zsiray, 1994). A review by Merino (1983) included two studies that indicated year-round education lowered achievement.

In addition to mixed results, the methods of previous research studies on academic achievement and year-round education have been called into question. Some studies do not differentiate between year-round programs that allow for additional days of instruction and those that simply restructure 180 days of school (Palmer & Bemis, 1999). Others study schools that have implemented a year-round calendar for only one or two years. Merino (1983) concluded that the benefits of year-round may not be evident for at least three years. Shields (1996) criticized past studies for flawed research methods and analytical procedures. Additionally, Shields (2000) found a preponderance of writings that took a clear position, for or against, a change to a non-traditional calendar demonstrating bias. Previous research has

been poorly designed (Kneese, 1996) and has raised questions of validity (Worthen & Zsiray, 1994). To date, no conclusive study has been done on academic achievement and year-round education (Shields & Oberg, 2000; Weaver, 1992). There was a demonstrated need for a study of academic achievement in established year-round schools with sound methodology, representing the most commonly used calendar, 45-15, in a school-within-a-school which provides a unique research environment.

Purpose

The purpose of this study was to examine the reading and math achievement of year-round and traditional calendar fifth grade students in an established school-within-a-school setting. This study focused on elementary schools that have had year-round programs that have been operational for at least three years. The school-within-a-school setting presented some interesting possibilities for research as well. Two calendars, year-round and traditional, are offered within a single elementary school building. The calendars within these schools are led by the same administrator, operate under the same policies and procedures, teach the same curriculum, and have similar school cultures. These variables have been disregarded by the multitude of previous studies that compare year-round and traditional schools in differing districts or year-round and traditional schools within the same district. Only two studies have compared academic achievement of year-round students to traditional students in school-within-a-school settings. One study compared year-round school-within-a-school and year-round school-wide students to traditional students (McMillen, 2001).The other study examined fifth and sixth graders in a year-round school-within-a-school setting in Canada (Ferguson, 1999). The need for research in an established school-within-a-school setting was evident.

Research Question

The aim of this research study was to answer the following question:

1. Do year-round calendar fifth graders have statistically significant higher reading and math scores on state selected standardized tests than traditional calendar fifth graders in a school-within-a-school elementary setting that has been operational for at least three years?

Methods

This study utilized an ex post facto comparison group posttest design. Participants included fifth graders in 2004-2005 from three school-within-a-school year-round elementary schools in the United States. The national percentile ranks from state selected standardized tests in reading and math were compared. Multiple analysis of covariance was utilized to analyze the test scores using the Statistical Package for the Social Science (SPSS) software. A detailed description of the methods for this study is included in chapter three.

Theoretical Perspectives

Organizational Effectiveness

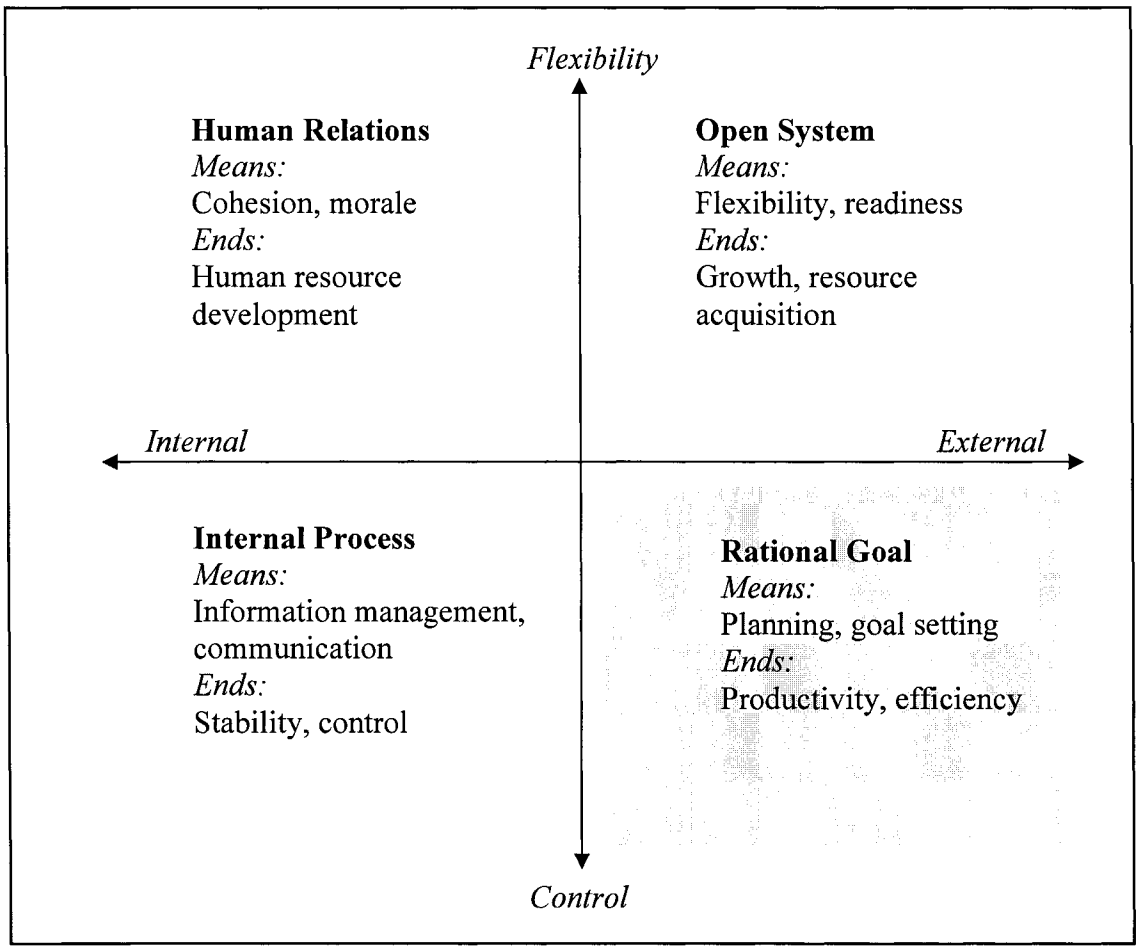
This study examined the impact of the non-traditional use of time, specifically year-round education, on reaching local, state, and national goals to improve academic achievement. This practice of measuring organizational, or school, effectiveness based on setting and reaching concrete goals, or academic achievement, reflects the rational goal model from the Competing Values Framework (Etzioni, 1964; Pfeffer, 1982; Price, 1972).

The Competing Values Framework was developed from research conducted on the major indicators of effective organizations (Cameron & Quinn, 1999). Quinn and Rohrbaugh (1983) discovered two underlying dimensions of organizational effectiveness. The first

centers around organizational focus, from an internal emphasis on the well-being and development of people in the organization to an external focus on the well-being and development of the organization itself. The second dimension's focus is structure, ranging from stability and control to flexibility and change. When these two dimensions are juxtaposed, a spatial model with four quadrants emerges (see Figure 1.3). Each quadrant represents one of the four major models of organization and management theory. The human relations model emphasizes flexibility with an internal focus, and builds cohesion and morale to boost human resource development. The open systems model emphasizes flexibility, but with an external focus. This model focuses on flexibility and readiness which leads to growth and resource acquisition. The internal process model emphasizes control with an internal focus, and builds stability through information management and communication. The rational goal model emphasizes control with an external focus. Productivity and efficiency are achieved through planning and goal setting. Organizations with clearly defined and easily measured goals may be assessed using the rational goal model (Selden & Sowa, 2003). Leaders assess the current position of the organization based on this framework as well as the desired position, and plan change to reach the desired position (Cameron & Quinn, 1999). With a current emphasis on reaching academic achievement goals, schools are planning for change using the rational goal theory.

As Griffith (2003) applied organizational theory to schools, he identified the attributes of effective schools and matched them to each of the four major models of organizational theory from the competing values framework. The effective school attributes

Figure 1.3. Competing Values Framework: Organizational Effectiveness



Adapted from: (Quinn & Rohrbaugh, 1983)

of optimizing learning time, emphasizing academics, and focusing on achievement were matched with the rational goals model. In utilizing the rational goal theory, some schools have adopted a year-round calendar in an attempt to alter the use of time which is an identified factor in learning. These schools have clear goals for academic achievement which are set by No Child Left Behind, their states and the local schools. The attainment of these goals is easily measured by standardized tests. The final step is to measure the effectiveness of using a year-round calendar to improve academic achievement.

While rational goal theory explains adopting a year-round calendar to improve academic achievement, some would argue that true school reform cannot take place without a systems approach. Supporters of a systems approach find the rational goal approach incomplete and oversimplified and find organizational life, in reality, full of surprises, complexities and ambiguities (Bolman & Deal, 1997). Since an early age people have been taught to break problems apart and to focus on symptoms rather than underlying causes, or to take a rational goal approach. To create fundamental change in our schools, system supporters argue that new ways of thinking and interacting must be learned that emphasize understanding the larger systems in which we live and work (Senge, 1991). Effective school leaders need multiple tools, the skills to use each and the wisdom to match them to situations (Bolman & Deal, 1997) while seeing the wholes, recognizing patterns and relationships, and learning how to structure those interrelationships in more effective and efficient ways (Senge, 1991). Changing the school calendar to increase academic achievement, it could be argued, oversimplifies school reform and disregards the complex system of schools. This study considered these concerns as standardized test scores of year-round and traditional students were examined.

Why Year-round May Impact Academic Achievement

Shields (2000) identifies three theories about why year-round education may have a positive impact on academic achievement. One explanation is that year-round students have more days of instruction than traditional calendar students. This may be true if the calendar is extended or intersession classes are required. None of the schools that participated in this study have added days to the school year or require attendance at intersessions. The second explanation is tied to curriculum. It may be possible that schools adopting a non-traditional

calendar may also be utilizing innovative curricula and teaching strategies. Once a school begins to consider a year-round calendar, this may be a catalyst for additional school reform (Shields, 1998). All of the schools utilized in this study reported the use of the same curriculum on both the year-round and traditional calendars. The third explanation, that had the greatest impact on this study, ties long summer vacations to learning loss. Material learned throughout the academic year is forgotten over the summer months when schools are closed. This requires additional review and reteaching of materials previously learned and slows the academic advancement of students. The theory that shorter, more frequent breaks from school aid retention of material and leads to greater academic achievement was explored in this study.

Significance

Educational Significance

Does a year-round calendar boost academic achievement? The answer to this question will significantly impact practices. Today schools are implementing year-round calendars without conclusive information on the impact on academic achievement. Schools will have additional information to use when considering implementation or continuation of a year-round calendar. This study will also impact policies. Legislators have announced plans to renew school calendar debates in Alabama, Georgia, South Carolina, and Texas, among other states (Cook, 2005). This study will give additional information to legislators considering school start and end dates, and the number of required days of school. Will flexibility allow for year-round calendars? Or will a year-round calendar be mandated? Information from this study will also be useful to school board members, administrators, teachers and parents who

are interested in academic excellence for all children. In addition, this study will contribute to the general educational knowledge base on school calendars and academic achievement.

Theoretical Significance

In addition to educational significance, this study has theoretical significance. Statistically significant gains by year-round students may create additional support for the rational goal approach to school reform. Increasing academic achievement by adopting a non-traditional calendar and measuring the success of the reform with standardized tests would indicate that utilizing the rational goal theory may be effective in leading school reform. On the other hand, if no statistically significant gains are realized on the year-round calendar, the lack of significance supports a systems approach to school reform. The schools in this study have moved to a year-round calendar in an effort to boost standardized test scores and have not participated in a systems approach to reform. Systems approach supporters would not expect year-round education, therefore, to be an effective way to increase academic achievement.

Summary

The aim of this study was to determine whether a year-round calendar has a significant positive impact on academic achievement in reading and math. The findings of this study will impact practice, policy, and theory as well as contribute to scholarly knowledge.

Chapter 2 will review literature on year-round education and academic achievement including summer learning loss, the findings of previous studies, and criticisms of methods utilized in previous studies. Chapter 3 will detail the methods of this study including the design, participants, instruments, data analysis and limitations. Chapter 4 will detail the

findings of this study and discussion the connections to previous studies. Finally, Chapter 5 will discuss conclusions that may be drawn from the findings of this study.

CHAPTER 2

REVIEW OF LITERATURE

This review of literature places the current study within the context of previous research studies. It also supports the need for the proposed study. Summer learning loss will be examined as an explanation for the connection between year-round calendars and increased academic achievement. In addition, previous studies of academic achievement in year-round schools will be reviewed. Finally, the criticism of the methods utilized in previous studies will be explored.

Summer Learning Loss

Summer learning loss is often the primary reason given for adopting a year-round calendar when attempting to increase student achievement. When students are away from schooling for the three summer months they lose some of the material that was learned during the previous nine months of instruction. Classroom teachers typically begin the traditional school year with several weeks of review in an attempt to overcome summer learning loss. Proponents of year-round education contend that shorter, more frequent breaks will aid retention and diminish summer learning loss (Glines, 1995). The regression in student learning over the summer is linked more to a lack of practice or opportunity to practice than to forgetting (Virginia Department of Education, 1992). The shorter, more frequent breaks of a year-round calendar provide for more continuous practice than a traditional school calendar. Therefore summer learning loss may be lessened.

The impact of summer learning loss is documented in previous studies. Harris Cooper and his colleagues (1996) reviewed 39 studies of the decline of achievement scores over summer vacation. Summer learning loss equaled about one month on a grade-equivalent

scale, or one-tenth of a standard deviation relative to spring test scores. After a summer vacation of three months, the previous nine months of instruction equated to eight months of learning. Cooper believed that summer learning loss may be even higher than research studies indicated because testing was not done on the last day and first day of the school year.

The impact of summer learning loss on retention may be dependent upon the age of the student. Allinder (1992) measured the effects of a 12-week summer break using curriculum based measurements tests. Students in second and third grade regressed in spelling but not math. The reverse was true for students in fourth and fifth grade. Reece (2000) also found that academic skill retention was age-specific. Early primary students enrolled in an alternative calendar school experienced significant academic gains while traditional students experienced significant declines. However, few differences were found for middle and upper primary levels. Cooper (2000) found that while summer educational programming benefited all students, the earliest grades and secondary students benefit the most. This study examined fifth graders who have experienced a long, traditional summer break of the traditional calendar, and others who have experiences the shorter, more frequent breaks of the year-round calendar.

The impact of summer learning loss may also be dependent upon the academic subject. In general, the impact seems to be greater for math than reading. Specifically, summer learning loss seems to be the most detrimental for math computation and spelling. Cooper believes that this may be the case because the learning of math seems more restricted to a formal educational setting than reading. He also acknowledges the differences in acquiring factual and procedural knowledge. Procedural knowledge has the greatest decline over the summer because it requires extensive practice. However, conceptual knowledge is

more dependent upon experience than practice and therefore is less impacted by summer learning loss (Cooper et al., 1996). This study examined standardized test scores in both reading and math.

Socio-economic status may be another factor that impacts the degree to which students are affected by summer learning loss. The long traditional summer vacation is particularly detrimental for at-risk students (Shields & Oberg, 2000). Lower- and middle-class students tend to have a greater decline in reading and language over the summer months. This decline may be attributed to fewer learning opportunities and/or less support for learning-related activities during the summer months (Cooper et al., 1996). Socio-economic status was controlled for in this study utilizing the free/reduced lunch status of students.

While summer learning loss may be impacted by the age and socio-economic status of the student, and the academic subject, it does not seem dependent on other student level variables. Intelligence, gender and ethnicity did not impact summer learning loss. Students who speak English at home and those who did not speak English at home were equally impacted by not attending school in the summer months (Cooper, 2004). This study also controlled for talented and gifted placement, special education placement, gender and ethnicity.

Summer learning loss has also been explored by surveying teachers and parents. Survey research has indicated that teachers teaching on the year-round calendar, and many teaching on the traditional calendar, believe that students need less review and are ready to be back to work after the short, frequent breaks offered with a year-round calendar (Axelrad-Lentz, 1996; Curry et al., 1997; Haenn, 1996; Utah State Board of Education, 1989). Teachers also note a continuity of instruction on the year-round calendar that they believe

leads to higher retention (Quinlan & George, 1987). Parents of both year-round and traditional students agree that the structure of vacations on a year-round calendar aids retention (Barker, 1990; Shields, 1996). Teachers and parents believe that students on a year-round calendar have greater retention and less summer learning loss than traditional students. This study examined the extent to which standardized test scores support these opinions.

Previous research on summer learning loss indicates that a long traditional summer vacation leads to a loss of at least one month of learning. This supports the notion that a year-round calendar with shorter, more frequent breaks could lead to increased academic achievement for at least some students in some subject areas or quite possibly all students.

Year-round and Academic Achievement

Previous research on the impact of year-round education on academic achievement has led to mixed findings, with some favoring year-round education, most finding no difference and two favoring traditional calendars. These inconclusive findings support the need for this study.

Positive Impact of Year-round

Several studies have indicated that a year-round calendar leads to increased academic achievement. Alcorn (1992) compared the academic achievement of six multi-track elementary schools to traditional elementary schools using the California Assessment Program and the Comprehensive Test of Basic Skills of third, fifth and sixth graders. Seventeen of the twenty-seven comparisons made favored year-round student test scores. Curry (1997) examined eleven elementary schools in Austin, Texas and made similar conclusions. The single-track 60-20 calendar year-round students had positive academic gains on standardized tests. Fardig (1992), who studied the Durham Public Schools,

compared two single-track year-round schools to traditional schools and found a positive effect on achievement and greater gains than expected after only one year of operation. Roby's (1995) study of sixth graders found statistical and practical results favoring year-round. Likewise, in 1994, Kneese compared six matched schools on the West Coast and found that mean gain scores were higher for year-round education students. Delphi District in Utah has also reported multi-track students exceeding traditional student when comparing six years of academic data. Later, Knesse (1996)conducted a meta-analysis of fifteen previous studies and found that the effect size favored the year-round calendar on all comparisons. However the magnitude of the differences varied greatly from negligible to large. Cooper (2003) predicted that while schools have a slightly better than fifty percent chance of students on a modified calendar outperforming their counterparts, the improvements in achievement scores are unlikely to be greater than one tenth of one standard deviation. Worthen and Zsiray (1994) summarized thirty-two studies and two reviews by stating that year-round students may have a slight, but not overwhelming advantage. Some previous studies indicate a positive, but often times, small impact of year-round education on academic achievement.

No Impact of Year-round

Other studies indicate that a non-traditional calendar has no impact on academic achievement. Dossett and Munoz (2000) compared the Comprehensive Test of Basic Skills scores of 95 single-track, year-round students to 95 traditional students who were from a large southeastern school district and matched by socio-economic status. They found no positive significant impact on cognitive variables. Similarly, McMillen's (2001) study of North Carolina third through eighth graders determined that year-round students scored no higher than traditional students. Pittman and Herzog (1998) also studied North Carolina

students. They compared grade point averages and California Achievement Test scores of students at one year-round elementary to two traditional elementary schools. No statistically significant difference was found in grade point average or standardized test scores. One Provo, Utah school discovered no clear-cut gains in standardized test scores after one year in operation (Van Mondfrans, 1985). Another study found that any difference in achievement between year-round and traditional students was erased when the groups were adjusted to equalize differences in race and socio-economic status (Penta, 2001). After an in depth study of year-round calendars, the Virginia Department of Education concluded that existing studies addressing student achievement revealed no consistent benefit or drawback on student learning (Virginia Department of Education, 1992). Palmer and Bernis (1999) reviewed 75 studies of which 42, a clear majority, found no effect of a year-round calendar on academic achievement. This study supported the findings of an earlier review by Merino (Merino, 1983) that concluded that most studies found no difference. While some studies report findings favoring academic achievement in year-round schools, the majority of studies indicated that the calendar has no impact, especially when groups are matched or statistically equalized. Peltier was not surprised that a year-round calendar made no difference in student achievement. The calendar does not add days, but simply rearranges the calendar. He believed that finding no difference is achievement may be seen as a positive for schools that are using year-round calendars to ease overcrowding or offer consumers choice (Peltier, 1991).

Negative Impact of Year-round

In addition to the many studies that favor year-round or find no difference in academic achievement, two studies are often cited for reporting negative effects of year-

round education. These studies were among nine studies reviewed by Merino in 1983. The first study, conducted by Harlan in 1973, reported negative effects among elementary students in third through sixth grades in reading, language arts, and math. The second study was conducted in 1978 by Matty with a sample that was 50% Spanish-surnamed. The study showed that ninth grade algebra students who were on a 45-15 calendar performed significantly worse than those on a traditional schedule, both on standardized tests and on teacher-constructed achievement tests. These two studies, with negative finding, appear to be exceptions to the norm.

Overall the previous studies of the impact of a year-round calendar on academic achievement have been mixed and inconclusive (Shields & Oberg, 2000; Worthen & Zsiray, 1994). There is a demonstrated need for additional study of this topic that will yield more conclusive results.

Student Level Variables

Previous research also indicates that year-round education may benefit particular groups of students more than others. A non-traditional calendar may benefit students of low socio-economic status to a greater degree than middle or high socio-economic status (Curry et al., 1997; Kneese, 2000). Also, Curry (1997) found that African-American and Hispanic students had increased standardized test scores when on a year-round calendar. According to Roby (1995) year-round may be more beneficial for males than females. In addition, it has been reported that lower achieving students may benefit from year-round education (McMillen, 2001; Shields, 1996). For this reason, student level variables must be considered and controlled for when researching academic achievement of year-round students.

School-within-a-school Studies

Offering both a year-round and a traditional calendar in a single elementary school, or the school-within-a-school structure, allows for some unique research opportunities. These schools operate under the leadership of one principal, offer the same curriculum for students, provide the same professional development for teachers, and function within the same school culture. While this school structure allows for comparison of student achievement while holding more variables constant, research in these schools is rare.

One study by McMillen (2001) examined achievement differences between year-round and traditional calendar students using two years of data from over 345,000 North Carolina public school students in second through fifth grades. He compared information from databases from the North Carolina Testing Program for four groups of students. Traditional students from school-wide programs, year-round students from school-wide programs, traditional students from school-within-a-school programs, and year-round students from school-within-a-school programs were compared. The results indicated no statistically significant differences in either reading or mathematics achievement between students attending a year-round calendar and those attending a traditional calendar after controlling for prior achievement, student gender, student ethnicity, and parent education level. In addition the results indicated that lower achieving students and Caucasian students may benefit slightly from being on a year-round calendar. In school-wide programs the majority of variance was within schools and not between schools. In the case of school-within-a-school programs the majority of the variance was between students and not between calendars.

Another study examined fifth and sixth grade students in a school-within-a-school setting in Canada (Ferguson, 1999). Standardized math scores were examined in the spring of fifth grade, and the fall and winter of sixth grade. No statistically significant differences were found between the year-round and traditional students during any of the testing periods. However, the traditional students made significant gains over the summer while the year-round students made gains, but not statistically significant gains.

While the school-within-a-school structure is rare, it presents a valuable setting for research. This study has added to the knowledge of this type of school and additionally utilized the school structure to strengthen the research method.

Criticism of Previous Methods

The research methods of previous studies of academic achievement in year-round schools have been harshly criticized. Previous research has been poorly designed (Kneese, 1996). Many studies simply survey the opinions of people with little or no experience with year-round education, or focus on anecdotes of personal experiences (Shields & LaRocque, 1996). As researchers reviewed previous studies (Hazelton, Blakely, & Denton, 1992; Hough, Zykowski, & Dick, 1990; Shields & LaRocque, 1996; Zykowski, Mitchell, & Gavin, 1991) many found articles that purport to be empirical research or evaluation reports were flawed in terms of research methods and/or analytical procedures. Many research studies were also criticized for being written from a preconceived position of support or rejection of the concept of year-round education (Shields & LaRocque, 1996). For example, Winters (1995) reviewed studies sent to him by the National Association for Year-round Education and not from an exhaustive literature search. Other studies do not distinguish between single-track and multi-track programs (Shields & Oberg, 2000) or year-round and extended year

programs (Palmer & Bemis, 1999; Shields & Oberg, 2000). Other studies have been criticized because they have not considered possible curriculum changes that may occur when moving to a year-round calendar (Merino, 1983). It is possible that as calendar structure is changed, curriculum is changed as well. Studies tend to attribute achievement changes to the calendar and disregard the impact of curriculum. Additionally, studies have been condemned for evaluating schools after only one or two years of operation. Merino (1983) stated that the benefits of year-round schooling may not be apparent until after three years of implementation.

Summary

A review of previous studies supported the need for this study. Past research indicates that summer learning loss may provide an explanation for the possible academic gains of year-round students. In addition, past research on the academic achievement of year-round students has led to conflicting and confusing results. Some research indicates small positive gains, while most research finds no difference between year-round and traditional students. However, a few studies have shown traditional students outperforming year-round students. A lack of research in school-within-a-school programs and questionable methods also indicated a need for this study.

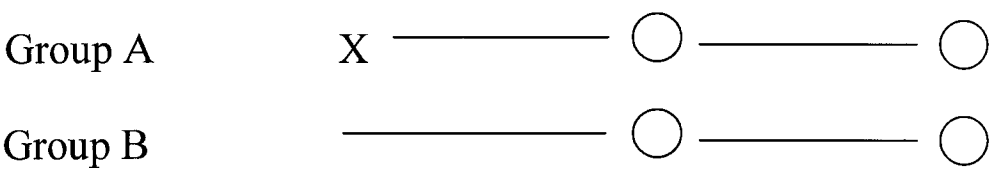
CHAPTER THREE

METHODS

Design

The study utilized an ex post facto comparison group posttest design (McMillan & Schumacher, 2001) (see Figure 3.1). This design is used after implementing a treatment. In this study a year-round program had been in place in the schools for a portion of the student body for several years before the research study was initiated. In this type of design, after the treatment, the researcher selects a comparison group and provides a posttest to both the experimental and comparison group (Creswell, 2003). This design was selected because it is

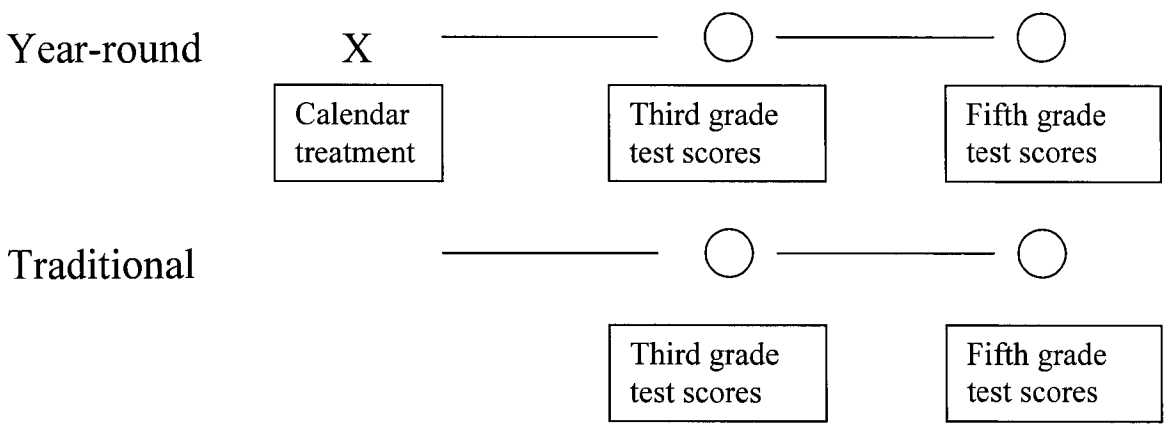
Figure 3.1: Ex post facto comparison group with posttests design



not feasible to randomly assign students to a year-round or traditional calendar for the purpose of conducting an experimental research study. Parents carefully weigh the needs of their children and family when selecting a school calendar. Although students cannot be randomly assigned, two comparable existing groups were compared within each school, those on a year-round calendar and those on a traditional calendar. Only the year-round students had received the treatment of attending school on a year-round calendar. Those students attending school on the traditional calendar comprised the comparison group. In this

case two standardized posttests were given; one in third grade and one in fifth grade (see Figure 3.2).

Figure 3.2: Ex post facto comparison group posttests design: Comparison of academic achievement of year-round and traditional students in a school-within-a-school setting



Participants

The schools selected for this study met set criteria developed from the literature review as described below:

1. Elementary school
2. Located in the United States
3. Offer both a year-round and traditional calendar within a single building
4. Leadership from one principal
5. Same curriculum taught on both calendars
6. Voluntary participation in year-round by teachers and students
7. Similar number of instructional days for both calendars at time of testing
8. Operates on a 45-15 year-round calendar
9. Operated a school-within-a-school year-round calendar for at least three years

10. Intersession attendance is not required

11. National percentile rank scores available for reading and math

These criteria were set based upon the literature review and the purpose of this study. Year-round calendars are found more frequently at the elementary level. The National Association for Year-round Education (2005) reports that in 2004-2005 there were 2,353 elementary schools in the United States on a year-round calendar, while only 309 middle schools and 265 high schools operated on the non-traditional calendar. School-within-a-school sites, offering both a traditional and year-round calendar within a single building, were selected because they offer an interesting opportunity for research. These schools are led by one principal, teach the same curriculum and operate within the same school culture. Previous studies that compare year-round and traditional schools, sometimes even in different districts, have not been able to consider these variables. The structure of the school-within-a-school setting allows for the comparison groups to be more similar. This study examines schools which allow students and teachers to self-select a calendar. Rarely a school will assign students to a particular calendar based on enrollment issues or student needs (Association of California Administrators, 1988). These schools are rare and did not meet the purpose of this study. It was also important to consider the testing date at each school. If the students in a school-within-a-school setting are tested in the fall, the year-round students have had as many as six additional weeks of instruction at the time of testing. This criterion ensures that the scores from the standardized tests are based upon a similar number of days of instruction. The schools selected for this study follow a 45-15 calendar, with nine weeks of instruction followed by three weeks of vacation. This is one of the most common year-round calendar structure (National Association for Year-round Education, 2004). The number of years that a

school had operated a school-within-a-school year-round calendar was essential to consider. Merino (1983) concluded that the benefits of year-round may not be evident for at least three years. For this reason, schools that have operated a school-within-a-school program for a minimum of three years were considered for this study. Additionally, schools with mandatory intersessions were not considered for this study. When students are required to attend intersessions this essentially adds days to the school calendar (Palmer & Bemis, 1999; Shields & Oberg, 2000). The focus of this study was on year-round calendars and not extended calendar programs. National percentile ranks were required to make comparisons across schools. Some schools assess student achievement with criterion referenced tests or state standardized tests with only state and local norms. These types of test scores would not allow for across school comparisons.

In an effort to locate as many schools as possible meeting these criteria, a database of school-within-a-school year-round programs was obtained from the National Association for Year-round Education. The database did not indicate whether the school-within-a-school programs in the database were at the elementary or secondary level. In the fall of 2004, each district was contacted by letter or e-mail and a list of elementary school-within-a school year-round programs was established. One additional school was identified during the review of literature. In the fall of 2005, each of those schools was contacted by phone. A brief interview was conducted to see if the school met the selection criteria (see Appendix A). These schools were also asked to identify additional schools that might meet the criteria. Phone interviews were then conducted with the additional schools. A total of 16 elementary school-within-a-school year-round programs were found in the United States. A list of potential participant schools was identified and contacted with more detailed information

about the study and invited to participate in the study. It was determined that seven schools met the criteria. Of these seven schools, two chose not to participate, two did not return data in a timely manner for inclusion in the study, and three schools met the criteria, were willing to participate, and provided necessary data. Each school was given a pseudonym to protect its identity (see Appendix B). Washington Elementary is located in the western United States and has operated a year-round school-within-a-school program for eight years. Adams Elementary and Jefferson Elementary are both located in the mid-west. Adams Elementary has operated a year-round school-within-a-school program for seven years, and Jefferson for ten years. After setting the selection criteria, and comparing schools to the criteria, these three schools comprised the participants for this study.

Variables

Independent Variables

The independent variable for this study was school calendar. The fifth graders from 2004-2005 at each participating school were divided into two groups which will act as the independent variables. One group will be comprised of fifth graders attending school on the year-round calendar and the other will be comprised of fifth graders attending school on the traditional calendar. Only students who have standardized test scores from third grade and fifth grade were utilized for this study. This ensured that students had been in attendance at their school for at least three years. School personnel provided information on the school calendar for each student.

Dependent Variables

The dependent variables for this study were standardized test scores. The national percentile rank for each student in reading and math was collected. Third and fifth grade

scores were collected for students who were in fifth grade during the 2004-2005 academic year. National percentile rank scores allowed for comparison across schools. Reading and math scores were selected because these subjects tend to be the focus of school reform due to the reporting requirements of No Child Left Behind. Summer learning loss research indicates that the impact of a long summer break may be greater in math than reading (Cooper et al., 1996). Therefore reading and math scores may be impacted differently by a year-round calendar. No additional testing of students was required for this study. Existing test data was collected from schools.

Co-variates

This study controlled for several student level variables. Co-variates included gender, ethnicity, talented and gifted placement, special education placement, and free/reduced lunch status. Previous research indicates that year-round school may benefit males (Roby, 1995), low-achieving students (McMillen, 2001; Shields, 1996), low socio-economic students (Curry et al., 1997; Kneese, 2000) and students of color (Curry et al., 1997) to a greater degree than other students. For this reason, student level variables were controlled for in this study.

Instruments

The schools that met the selection criteria and were willing to participate in the study are scattered throughout several states in the United States. Each state or school district selects the standardized tests that will be used to measure academic achievement of students. Therefore, several different instruments were selected to measure academic achievement in the schools that participated in this study.

Iowa Test of Basic Skills

The Iowa Test of Basic Skills (ITBS) was one of the standardized tests used to measure academic achievement in reading and math. The test is designed to provide a comprehensive assessment of student progress in the basic skills. The test meets several educational purposes including monitoring year-to-year developmental differences and to provide test results that may be used to improve the quality of instruction. These match the purpose of this study. The Mental Measurements Yearbook states that the ITBS is one of the oldest and the best in the business and is supported by exemplary research and documentation. Overwhelming evidence is provided that the ITBS scores provide valid measures of basic academic skills. In addition, ITBS prides itself on its reliability, claiming rightly that its reliability levels are among the highest in the test industry. It is well constructed and reliable for individual and group judgments (Impara & Plake, 1998).

California Achievement Test – 5

The California Achievement Test-5 (CAT-5) also was used to measure academic achievement in reading and math. This test measures students' educational development in five areas including reading and math. A reviewer of the test commended the test developers for making deliberate efforts in the planning, writing, and selection of the items to assess students' ability to integrate information and apply more complex thinking processes. In addition, the reviewer states that developers did an admirable job in reflecting both the then-current and possible-future curriculum practices. Validity and reliability are generally high. The Mental Measurements Yearbook finds that the CAT-5 continues the tradition of earlier editions of the California Achievement tests by producing a technically solid achievement assessment tool (Impara & Plake, 1998).

Idaho Standards Assessment Test

The Idaho Standards Assessment Test (ISAT) was also used to measure student achievement in this study. The ISAT became a required Idaho state assessment in 2002. After the Idaho State Legislature approved the state achievement standards, the State Board of Education appointed a committee to find an assessment that would provide the confirmation that those standards were being taught in Idaho schools. In the fall of 2002 the State Board introduced the ISAT, a computer delivered multiple-choice test including reading and math (Idaho Department of Education, 2005).The ISAT provides assessment of student progress in mastering skills and, when administered regularly, whether an individual student is making satisfactory progress. In addition, test results can be used for instructional planning (NWEA, 2005). An independent examination of the ISAT by the Human Resources Research Organization (Hoffman, Diaz, & Dickinson, 2005) found that the test has reliability estimates in ranges typical for these kinds of assessments.

Analysis of Data

The calendar assignment, national percentile ranks in reading and math, and demographic information for each student in the selected schools was entered into the Statistical Package for the Social Science (SPSS) software. Two additional variables were created to measure growth. The variable "reading difference" was created by subtracting the third grade percentile rank in reading from the fifth grade percentile rank. The variable "math difference" was created in a similar manner. Descriptive statistics were calculated including number of participants on each calendar in each school and on each calendar across schools. Descriptive statistics were also calculated for each student variable. The mean reading and

math percentile for each group was calculated, as well as the mean "reading difference" and "math difference".

To answer the research question without controlling for student level variables, an independent-samples t-test was conducted. The independent-samples t-test evaluates the difference between the means of two independent groups and determines if the mean value of the test variable for one group differs significantly from the mean value of the test variable for the second group (Green & Salkind, 2005). In this study the mean test score in reading for traditional students and the mean test score for year-round students were compared. Similar t-tests were computed for math scores as well as reading and math differences.

To answer the research question while controlling for student level variables, analysis of covariance was conducted for reading and math scores, as well as reading and math differences. When a researcher uses an experimental research design, the researcher identifies and controls independent variables that can help to explain the observed variation in the dependent variable (Hinkle, Wiersma, & Jurs, 2003). In this study, this would have required random assignment to school calendars while controlling for gender, ethnicity, special education placement, talented and gifted placement, and free/reduced lunch status. It was not feasible to conduct an experimental research study for this project. Parents carefully weigh the needs of their children and family when selecting a school calendar. Therefore, it was necessary to statistically control these variables. Analysis of covariance (ANCOVA) is used primarily as a procedure for the statistical control of extraneous variables. ANCOVA, which combines regression analysis and analysis of variance, controls for the effects of the extraneous variables, called covariates, by partitioning our the variation attributed to these additional variable (Hinkle et al., 2003). In this study, utilizing ANCOVA allowed a report of

the variance attributable to school calendar, and the amount of variance attributable to the covariates. It has been emphatically stated that using ANCOVA to statistically adjust preexisting differences in existing groups must be used with caution (Hinkle et al., 2003). While caution was exercised, ANCOVA was appropriate for this study because random assignment was not possible.

There are several assumptions underlying the use of ANCOVA. Assumptions include that the dependent variable is normally distributed, the relationship between the dependent variable and the covariates is linear, and the regression lines within each group are linear and parallel. This assumption is often called the homogeneity of regression (Hinkle et al., 2003). To ensure that these assumptions were met distributions were graphed.

Researcher Interest and Role

I became interested in studying the academic achievement of year-round and traditional students several years ago. The idea for this research study came from working as the counselor at a school-within-a-school year-round elementary school for eight years and having a daughter enrolled in the program. As a member of the school staff I heard the emotional speeches in favor of, and in opposition to, the program. However, no research had been done to determine the academic impact of the year-round calendar. As a scholar I read previous research studies and was frustrated by the confusing and inconclusive findings. And as a parent I found no conclusive information to base enrolling our daughter in the year-round or traditional program. These experiences and frustrations led to the development of this study. I had no preconceived notions about the results of this study. The purpose of this study was not to make a case for or against year-round education, but rather to gather and report accurate information about the program and its impact on academic achievement.

Ethical Considerations

This study conformed to high ethical standards. Building principals and/or district superintendents gave permission to review individual student test scores. During data collection, school personnel removed any identifying marks, including name, from the student information. Student test scores remained confidential and are reported only in summary form. Because this is an ex post facto study of test scores, there was no danger of harm to students. In addition, this study was submitted for approval to the Iowa State University Institutional Review Board and deemed exempt from human subject status.

Delimitations and Limitations

This study was confined to elementary school-within-a-school year-round programs within the United States. This study was also limited to the academic areas of reading and math. The findings of this study were based upon specific standardized tests. In addition, it was not possible to use randomly assign students to a particular calendar for a classical experimental design. Instead, analysis of co-variance will be used to statistically control for differences between the year-round and traditional groups. Despite these limitations, this study focused on the most common form of year-round calendar, the 45-15 model. This study also utilized student bodies that reflected the student body of its state and has added to the general knowledge of the impact of year-round education on academic achievement.

CHAPTER FOUR

RESULTS AND DISCUSSION

The Participants

Three elementary schools with year-round school-within-a-school programs supplied data regarding fifth grade students from the 2004-05 school year. These schools supplied complete data for a total of 169 students (see Appendix C). Males comprised 55% of the students. Nearly 9% of the students were identified as talented and gifted and 13% received special education services. Almost 18% of the students received free/reduced lunches and nearly 9% were students of color. Slightly more than half (56.2%) attended school on the traditional calendar, while 43.8% attended school on a year-round calendar.

The participants were also examined by school (see Appendix D). Slightly more than half of the students from Washington Elementary and Adams Elementary attended school on the traditional calendar, while year-round students were in the majority at Jefferson Elementary. Males and females were evenly divided except at Washington Elementary where 60% of the participants were male. The talented and gifted students comprised 6.2% (Washington) to 11.5% (Jefferson) of the students participating, while special education students accounted for 7.7% (Washington) to 16.7% (Jefferson) of the enrollment. Free/reduced lunch status were not available from Washington Elementary. However, 65.4% of the participating students at Adams Elementary received free/reduced lunches, as did 16.7% of the Jefferson Elementary students. White or Caucasian students make up the majority at all three schools. Students of color comprise a low of 5.1% (Jefferson) to a high of 19.2% (Adams).

The student participants at each school were also compared to state percentages for talented and gifted, special education, and ethnic background (see Appendix E). Washington Elementary has slightly higher numbers of talented and gifted and special education students who participated in the study than the state average (National Center for Education Statistics, 2003) as well as slightly more white/Caucasian students (United States Department of Education, 2002). The percentage of talented and gift (National Center for Education Statistics, 2003) and white/Caucasian students (United States Department of Education, 2002) who participated in this study from Adams Elementary was somewhat lower than the state average, while the number of special education students (National Center for Education Statistics, 2003) closely matched the state average. Participants from Jefferson Elementary included slightly higher percentages of talented and gifted, special education (National Center for Education Statistics, 2003), and white/Caucasian (United States Department of Education, 2002) students than the state averages. It is important to note that the student groups from each elementary school that participated in this study generally echo the demographics of their state. Therefore the results of this study could be generalized to larger populations with greater confidence.

Calculated Means

After the participants were examined, several mean scores were calculated. The mean national percentile rank in reading and math was calculated for traditional and year-round students. The mean was also calculated for reading and math difference, the third grade national percentile rank subtracted from the fifth grade national percentile rank, for traditional and year-round students (see Appendix F). In all comparisons the mean score for year-round students was higher. The mean reading national percentile rank for traditional

students was 61.2211, while the mean for year-round students was 72.0270. The mean for year-round students in math (67.2432) was also higher than the mean for traditional students (60.6316). When the mean reading difference score was calculated, the mean for year-round students (1.3919) was again higher than the mean for traditional students (-.4316). The negative mean score for traditional students indicates that the average national percentile rank was lower in fifth grade than in third grade. As with the mean reading difference, the mean math difference was higher for year-round students (6.4189) than traditional students (2.6211). In all four mean comparisons, the year-round students outperformed the traditional students.

Normal Distribution of Test Scores

One assumption of both independent-samples t-tests and multiple analysis of covariance, the two statistical tests used in this study, is that the test variables are normally distributed. To test this assumption, histograms were created for six variables, third grade reading and math scores, fifth grade reading and math scores, and the difference in reading and math scores, which were created by subtracting the third grade score from the fifth grade score (see Appendix G). The histograms and skewness scores indicate that both the reading and math scores from third grade had greater numbers of high achieving students than a normal distribution. This is evident from the skewness score for third grade math of -.398 and for third grade reading of -.384. The fifth grade scores were similarly skewed with skewness scores of -.583 for math and -.360 for reading. The reading and math difference scores were skewed as well with skewness scores of -.073 for math and -.407 for reading. An attempt was made to utilize logarithms of these variables to achieve a more normal distribution. While this technique is often successful, in this case utilizing logarithms

accentuated the problem pushing the variables further away from a normal distribution. For this reason, the variables were maintained in their original state.

Statistically Significant Differences in Mean

Knowing that there was a difference in mean scores favoring the year-round students, the scores were then analyzed using an independent-samples t-test to determine if there was a statistically significant difference in the means (see Appendix H). The independent-samples t-test evaluates the difference between the means of two independent groups and determines if the mean value of the test variable for one group differs significantly from the mean value of the test variable for the second group (Green & Salkind, 2005). Levene's test for equality of variances was also performed. Levene's test evaluates the assumption that the population variances for the two groups are equal (Green & Salkind, 2005). In this case, Levene's test revealed that equal variances could be assumed in all cases. Therefore, the standard t value was reported. Of the four t-tests performed only one was statistically significant. The difference in the mean scores for year-round students and traditional students in math was statistically significant ($t = -3.082$, $p = .002$). However the mean scores for reading, ($t = -1.859$, $p = .065$), math difference ($t = -1.659$, $p = .099$), and reading difference ($t = -.816$, $p = .416$) were not statistically significantly different from one another for year-round and traditional students. This indicates that while the mean scores for year-round students were higher than the mean scores for traditional students, these results may have been due to chance in three out of the four comparisons.

Creating the ANCOVA Model

While the independent-samples t-test determines if there are statistically significant differences in the mean scores of two groups, year-round students and traditional students, it

does not have the capability to control for other variables which may influence the mean scores. For this reason, it was necessary to further analyze the data using analysis of covariance (ANCOVA). ANCOVA allows for statistical control of extraneous variables which may influence the dependent variable, in this case talented and gifted placement, special education placement, free/reduced lunch status, ethnic background and sex were considered. Three additional variables were included in the appropriate models because they increased the models ability to predict. These variables included third grade math and reading scores and school. Hinkle, Wiersma, and Jurs caution researchers against the tendency to follow what they call the "more-the-merrier" syndrome, or to continue adding predictor variables even though including more than five or six predictor variables rarely produces a substantial increase in the multiple R (Hinkle et al., 2003). To avoid this syndrome, the backward solution was utilized. In this procedure all predictor variables and their interactions were entered into the full model, and then individual predictors were deleted if they did not make a significant contribution (Hinkle et al., 2003). Using this procedure, interaction variables were eliminated from the model because they did not make a significant contribution. In an additional attempt to limit predictor variables, a new variable was created combining special education placement and talented and gifted placement. This new variable was called special program placement and identified students who were placed in a special program at either end of the spectrum, talented and gifted or special education.

Fifth Grade Math Results

Using the model constructed with the backward solution, an analysis of co-variance was conducted to determine the effect of third grade math scores, school, calendar, sex, special program placement, and ethnicity on fifth grade national percentile rank in math (see

Appendix I). Third grade math scores ($p < .001$), school ($p < .001$) and calendar ($p = .014$) all had a statistically significant impact on fifth grade national percentile rank in math. However, sex, special program placement, and ethnicity did not have a statistically significant impact. Third grade math scores were the most powerful in predicting fifth grade math scores. The partial eta squared indicates that 63.8% of the variation in fifth grade math scores can be explained with third grade math scores, while 9% of the variation can be explained with school. Calendar, which is the focus of this study, accounts for 3.7% of the variation in fifth grade national percentile rank. The estimated marginal means help us to understand the magnitude of the impact on calendar on math scores. Controlling for the other variables, the mean fifth grade national percentile rank was 61.822 for traditional students and 67.047. In other words, controlling for other student level variables, year-round students outscore traditional students by 5.165 national percentile points.

Fifth Grade Reading Results

An analysis of covariance was also conducted using the same variables to determine their impact on fifth grade national percentile ranks in reading. Again, third grade reading scores ($p < .001$) were significant and accounted for 65% of the variation in national percentile rank. School ($p < .001$) was also significant and accounted for 11.3% of the variation in national percentile rank. All other variables were not significant. This included calendar ($p = .424$) which is the focus of this study. Calendar does not have a statistically significant impact on fifth grade national percentile rank when controlling for other student level variables.

Math Difference Results

The variable called math difference was created by subtracting the third grade national percentile rank from the fifth grade national percentile rank. This variable examines the academic growth in math from third grade to fifth grade. An analysis of covariance was conducted to examine the impact of third grade math scores, school, calendar, sex, special program placement, and ethnicity on the growth from third grade to fifth grade in math. Third grade math scores ($p < .001$), school ($p < .001$) and calendar ($p = .014$) were all statistically significant. Third grade math scores predict 19.1% of the variance in math differences, while school predicts 9% of the difference. Calendar, the third statistically significant variable, accounts for 3.7% of the variation in the math difference. The estimated marginal means indicated that traditional students' national percentile rank remains fairly stable from third grade to fifth grade with a mean math difference of .214. However, year-round students demonstrate a mean math difference of 5.379. Therefore, the year-round students average a 5.165 greater growth in national percentile rank in math from third to fifth grade than the traditional calendar students.

Reading Difference Results

A similar analysis of covariance was conducted to determine the impact of these same variables on reading difference. This variable was constructed in a similar manner, subtracting the third grade national percentile rank from the fifth grade national percentile rank. Similar to the analysis of covariance conducted on fifth grade math scores, the third grade reading scores ($p < .001$) and school ($p < .001$) had a statistically significant impact on the reading difference. All other variables, including calendar ($p = .424$) were not statistically significant. While this indicates that the impact of calendar on the reading difference may be

attributable to chance, it is interesting that the estimated marginal means for year-round and traditional students are both negative. While both calendar groups had lower national percentiles in fifth grade than in third grade, this drop was less for the year-round students (-0.401) than for the traditional students (-2.046).

Additional ANCOVA Analysis

An additional ANCOVA analysis was necessary because free/reduced lunch status was not available from Washington Elementary. The previously reported ANCOVA analysis included students from all three elementary schools. For this to be possible, free/reduced lunch status had to be removed from the analysis. An additional ANCOVA analysis was conducted with the student data from Jefferson Elementary and Adams Elementary which included free/reduced lunch status. This analysis included the three statistically significant variables from the first analysis, third grade national percentile rank, school, and calendar, as well as free/reduced lunch status. This model continued the backward solution approach by keeping the most powerful variables in the model. This analysis was conducted for fifth grade math, fifth grade reading, math difference and reading difference.

The analysis for fifth grade math national percentile rank (see Appendix M) indicated that third grade math scores ($p < .001$), school ($p = .001$), and calendar ($p = .047$) had a statistically significant impact. Free/reduced lunch status ($p = .506$) did not make a statistically significant impact on math scores. While calendar was just barely statistically significant, the estimated marginal means shows that year-round students ($\underline{M} = 61.683$) outscored the traditional students ($\underline{M} = 55.993$) by an average of 5.690 national percentile ranks when free/reduced lunch status is controlled.

The analysis for fifth grade reading national percentile rank (see Appendix N) indicated that third grade reading scores ($p < .001$) had a statistically significant impact. However, school ($p = .392$), calendar ($p = .402$), and free/reduced lunch status ($p = .642$) did not have a statistically significant impact on fifth grade reading scores.

A similar analysis was conducted using reading difference and math difference scores. Math difference scores (see Appendix O) were statistically significantly impacted by third grade math scores ($p = .001$), school ($p = .001$), and calendar ($p = .047$). Free/reduced lunch status did not make a statistically significant difference in math growth from third grade to fifth grade. The estimated marginal means shows that while the traditional calendar students averaged a loss of 1.607 national percentile points from third to fifth grade, year-round calendar students averaged a gain of 4.083 national percentile points.

In the final ANCOVA analysis, reading differences (see Appendix P) were examined. Reading growth from third grade to fifth grade was statistically significantly impacted only be third grade reading scores ($p < .001$). All other variables, school ($p = .392$), calendar ($p = .402$), and free/reduced lunch status ($p = .642$) were not statistically significant.

Discussion of Results

These findings seem to echo Cooper's findings that summer learning loss is most detrimental for math computation. In all comparisons of math national percentile rank and math growth from third to fifth grade, a year-round calendar made a statistically significant difference. Cooper suggests that math may be impacted to a greater degree by a long summer break because math is more restricted to a formal education setting than reading and reflects procedural knowledge which requires more practice (Cooper et al., 1996). Comparisons of math performance included comparison of the means, t-tests, ANCOVA for student level

variables, ANCOVA for free/reduced lunch status for math national percentile rank and math growth. Of the eight comparisons regarding math, seven showed a statistically significant impact of the year-round calendar. Perhaps the shorter and more frequent breaks of the year-round calendar have diminished the impact of summer learning loss on math skills by allowing more practice of procedural knowledge as Cooper has suggested.

When comparing the growth of students' performance from third grade to fifth grade in reading and math, four of the eight comparisons found statistically significant differences favoring year-round education. While the math and math difference means were higher for year-round students, and the ANCOVA analysis for math differences favored the year-round calendar, the four other comparisons were not statistically significant. These findings may be indicative of another study by Cooper which indicates that summer educational programming, while beneficial to all students, has its greatest impact during early elementary school years (Cooper et al., 2000). It may be the case that, while the cumulative effect of year-round education is significant, the span from third grade to fifth grade is not significant in many comparisons. This may support Cooper's finding that the greatest impact is during the earlier elementary school years.

Two variables other than calendar, third grade test scores and school, were repeatedly found to have a statistically significant impact on math and reading national percentile rank and the growth in both reading and math from third grade to fifth grade. It seems quite logical that prior academic performance would be a strong predictor of later academic achievement and the amount of growth in a two year span. It was more surprising to find that, in this study, school was a powerful predictor of fifth grade math and reading performance as well as growth in both subjects. These three schools were similar in many

ways. They were all elementary schools located in the United States offering both a year-round and traditional calendar within a single building. Both calendars within each building were led by one principal and were being offered the same curriculum. All three schools have operated on a 45-15 calendar for at least three years and do not require intersession attendance. In addition, participation on the year-round calendar is voluntary for both students and teachers. However, with all of these similarities, there were still statistically significant differences in math and reading national percentile ranks and the growth in both subjects from third grade to fifth grade that were predicted by school. This raises questions about what other differences may exist between the three schools that account for school being a powerful predictor of academic performance and growth.

Overall, sixteen comparisons of year-round student and traditional student achievement and growth were made. When the mean scores of national percentile rank in reading and math, as well as the mean growth in both subjects, were compared, all four comparisons favored year-round education. When *t*-tests were utilized to determine if these differences were statistically significant, only one of four comparisons, math national percentile rank, was found to be significant. Four additional comparisons were made using ANCOVA and student level variables. The two comparisons for math were statistically significant while the two for reading were not. Similar results were found when conducting the final four comparisons, ANCOVA including free/reduced lunch status, where once again the two math comparisons were statistically significant, while the two reading comparisons were not. In the end, two of eight reading comparisons were in favor of year-round education, while seven of eight math comparison favored year-round education.

CHAPTER FIVE

CONCLUSIONS

The aim of this research study was to answer the following question: Do year-round calendar fifth graders have statistically significant higher reading and math scores on state selected standardized tests than traditional calendar fifth graders in a school-within-a-school elementary setting that has been operational for at least three years? Based upon the statistical analysis of data from three year-round school-within-a-school elementary schools, the answer appears to be "yes", and especially so in mathematics. The year-round students outperformed the traditional calendar students according to mean scores for fifth grade reading national percentiles, fifth grade math national percentiles, and the growth from third to fifth grade in both subjects. The difference in the mean scores for fifth grade national percentile rank in math was statistically significant according to a t-test. In ANCOVA comparisons which controlled the calendar groups for student level variables, the year-round students statistically significantly outperformed the traditional students in all comparisons in mathematics, but not reading.

Theoretical Significance

What is the theoretical significance of these findings? Each of the schools that were studied operated a school-within-a-school year-round program. Both of the calendars within these schools were led by the same principal, taught the same curriculum, participated in the same professional development programs, and operated within the same district. While these variables were often overlooked in previous studies, these similarities make it increasingly likely that any systems approach to school reform, new ways of thinking and interacting that emphasize understanding the larger systems in which we live and work (Senge, 1991), would

impact the teachers, students, communities, and ultimately academic achievement in similar ways. These findings indicate that school is a powerful predictor of academic achievement, even more so than calendar. It therefore follows that a systems approach to school reform is likely a powerful approach. However, the statistically significant impact of calendar, although less powerful than school, cannot be overlooked. It is likely that a systems approach to school reform, while powerful in and of itself, can be enhanced by taking a rational goal approach to fine tune goals beyond the improvements made with a systems approach. For example, after a school or school district has seen the wholes, recognized patterns and relationships and learned how to structure interrelationships in more effective and efficient ways (Senge, 1991), the impact of a systems approach will have been felt. However, in looking for additional ways to boost achievement, a rational goals approach may be incorporated. Perhaps a school is interested in boosting mathematics achievement in its elementary schools beyond the point to which a systems approach to school reform has taken them. It appears that, with that goal in mind, a year-round calendar may be a planned change that could assist the school in reaching its desired outcome (Cameron & Quinn, 1999) of increased mathematics achievement. The findings of this study indicate, with school as a powerful predictor of academic achievement, that a systems approach cannot be ignored. However, with calendar being a significant predictor as well, the rational goal approach should not be dismissed in total.

Educational Significance

What is the educational significance of these findings? How might educational practices be impacted? The schools that choose to implement a year-round calendar simply to ease overcrowding or to offer consumer choice, and not to boost academic achievement,

should see these findings in a positive light. As Peltier suggests (1991), even finding no differences in academic achievement supports the use of the innovative calendar. Schools can restructure a calendar for these reasons, and not be concerned about the changes having a negative impact on academic achievement. But, what about the schools that make the change to a year-round calendar to increase academic achievement? Is this a valid reason to implement an innovate calendar? Considering the findings of this study, the answer seems to be dependent upon the academic subject. If the district is primarily interested in boosting reading achievement, they are likely to see small, but not statistically significant gains. However, if the goal is to increase mathematics achievement, statistically significant gains in national percentile rank and in mathematics achievement growth from third to fifth grade may be expected.

Is this impact great enough to suggest that year-round calendars should be mandated in large numbers? With the powerful position of summer vacation in our nation's culture, economy, and historical memory (Gold, 2002), it will likely take mandated changes, or at the least persistent advocates battling for calendar changes, to implement this innovative calendar on a more wide spread basis. However, because there are even more powerful predictors of academic achievement than calendar, it may be best to leave such an emotional educational decision at the local level. Local decision makers can take into account the special needs of their particular students. This of course implies that state and national leaders will allow flexibility in considering school start and end dates, as well as the number of required days of school, which would allow for year-round calendar implementation.

How might these findings impact parents who are given the choice of selecting a traditional or year-round calendar for their child? If parents are selecting the year-round

calendar for reasons other than academic achievement, because the innovative calendar is a nice fit with their work schedule or to allow for vacations other than during the summer months, they can feel confident that their calendar choice will not have a negative impact on their child's academic performance. The parent who selects a year-round calendar for academic reasons should be aware that a year-round calendar seems to impact specific subjects differently. Therefore, selecting the year-round calendar to boost math performance is more logical that selecting the alternative calendar to increase reading achievement.

Further Study

While this study has added to the general knowledge base regarding year-round education and has theoretical and educational significance, additional research is recommended. Because school was a powerful predictor of academic achievement, additional investigation into the impact of specific school-level variables would be appropriate. Are there differences in the way that the calendar was implemented or in the building leadership? What other difference exist between schools that operate year-round calendars? Another issue that was beyond the scope of this study is the voluntary nature of the year-round program at each of these schools. When teachers and students volunteer for the program are there significant differences in who takes the initiative to participate in the innovative calendar structure? For example, are voluntary year-round students more likely to have parents who are highly involved in their overall education or more likely to be highly educated? Are the teachers who volunteer for the innovative calendar more likely to teach using innovative teaching methods? In addition, longitudinal studies would allow academic achievement to be studied over time. Another interesting possibility for additional study is the impact of a school-with-in-a-school year-round calendar on the building principal. The

principals in this unusual setting are leading two programs within a single building which may lead to leadership challenges and opportunities that are not found in a more traditional setting.

Ultimately this study has found that year-round calendar students do statistically outperform traditional students in mathematics. In addition, this study adds new information to the general knowledge base regarding year-round education as well as informing educational theory and practice.

Definitions

45-15 plan – four nine-week quarters separated by a three-week vacation (National Association for Year-round Education, 2004)

60-20 plan – sixty days of instruction followed by twenty days of vacation (National Association for Year-round Education, 2004)

90-30 plan – ninety days of instruction followed by thirty days of vacation (National Association for Year-round Education, 2004)

intersession – mandatory or optional supplementary program for remediation and enrichment (Glines, 1995)

extended school year – days of school are added to the school calendar, students may attend 200 or 210 days instead of 180 days (Association of California Administrators, 1988)

multi-track - divides students and teachers into groups, or tracks of approximately the same size, each track is assigned its own schedule, and teachers and students assigned to a particular track follow the same schedule and are in school and on vacation at the same time, primarily used to alleviate overcrowding (National Association for Year-round Education, 2004)

school-within-a-school – both a year-round and nine-month calendar are offered in the same building, with a portion of the student body attending each (Mutchler, 1996)

single-track – year-round students and school personnel follow the same instructional and vacation schedule; single-track does not reduce class size, nor does it allow a school to accommodate more students (National Association for Year-round Education, 2004)

traditional calendar - nine-month agrarian calendar with long summer vacation (National Association for Year-round Education, 2004)

year-round calendar - calendar that allows for continuous education with a shorter summer vacation and more frequent breaks during the periods of instruction (National Association for Year-round Education, 2004)

APPENDICES

Appendix A

Phone Interview Protocol

District:

School:

Location:

Date: Contact:

Date: Contact:

Date: Contact:

I am a doctoral student at Iowa State University and am in the preliminary stages of working on my dissertation. I am currently interested in locating elementary schools that offer both a traditional and year-round calendar. The National Association for Year-round Education indicated that there may be such a school in your district. Would you please take a few minutes and provide the following information?

Does your district have a school that offers both a traditional and year-round calendar in the same building?

Is it an elementary school?

If they answered yes to both questions, ask the following:

What is the name of the school?

Why did your school adopt a year-round, school-within-a-school calendar model?

What type of year-round calendar did your school adopt? 45-15? 60-20? single-track? multi-track?

How long has it operated on a school-within-a-school calendar?

Do year-round and traditional students attend school for the same number of days?

Do you offer intersessions? If so, are these required?

What grade levels are in the building?

Is the same curriculum taught on both calendars?

Are both calendars under the leadership of the same principal?

How many students are enrolled?
Total? Traditional? Year-round?

Are students assigned to a calendar or do they volunteer? If assigned, how so?

Are teachers assigned to a calendar or do they volunteer? If assigned, how so?

What standardized test do your students take? At what grade levels?

Have students on year-round and traditional calendars attend school for the same number of school days when the standardized tests are given?

Are there any other special characteristics of this school that I should be aware of?

What other school-within-a-school, year-round elementary schools are you aware of?

I am interested in writing my dissertation on academic achievement in year-round, school-within-a-school settings. I would like to contact your district with more details of my study. Who should I contact? Please provide an e-mail and mailing address as well as a phone number.

Contact:

Phone number:

E-mail:

Address:

Thank you for your time!

Appendix B

Participant schools location and years of operation

School (Pseudonym)	Location	Years on Calendar
Washington	West	8
Adams	Mid-west	7
Jefferson	Mid-west	10

Appendix C

All Participants by Student Variable (number and percentage)

Student variable	Number	Percent
Traditional	95	56.2%
Year-round	74	43.8%
Male	93	55.0%
Female	76	45.0%
TAG	15	8.9%
Not TAG	154	91.1%
Special education	22	13.0%
Not special education	147	87.0%
Free/reduced lunch*	30	17.8%
Nor free/reduced	74	43.8%
White/Caucasian	154	91.1%
Students of color	15	8.9%

*free/reduced lunch status was not available for Washington Elementary

Appendix D

Participants by School (number and percentage)

Student variable	Washington		Adams		Jefferson	
Traditional	42	64.6%	15	57.7%	38	48.7%
Year-round	23	35.4%	11	42.3%	40	51.3%
Male	39	60.0%	13	50.0%	41	52.6%
Female	26	40.0%	13	50.0%	37	47.4%
TAG	4	6.2%	2	7.7%	9	11.5%
Not TAG	61	93.8%	24	92.3%	69	88.5%
Special education	5	7.7%	4	15.4%	13	16.7%
Not special education	60	92.3%	22	84.6%	65	83.3%
Free/reduced lunch*	NA	NA	17	65.4%	13	16.7%
Not free/reduced lunch	NA	NA	9	34.6%	65	83.3%
White/Caucasian	59	90.7%	21	80.8%	74	94.9%
Students of color	6	9.3%	5	19.2%	4	5.1%

*free/reduced lunch status was not available from Washington Elementary

Appendix E

Participants Compared to State Percentages

Student variable	Washington	State	Adams	State	Jefferson	State
TAG	6.2%	3.8%	7.7%	11.3%	11.5%	8.1%
Special education	7.7%	3.8%	15.4%	15.8%	16.7%	15.5%
White/Caucasian	90.7%	87.0%	80.8%	84.0%	94.9%	88.2%

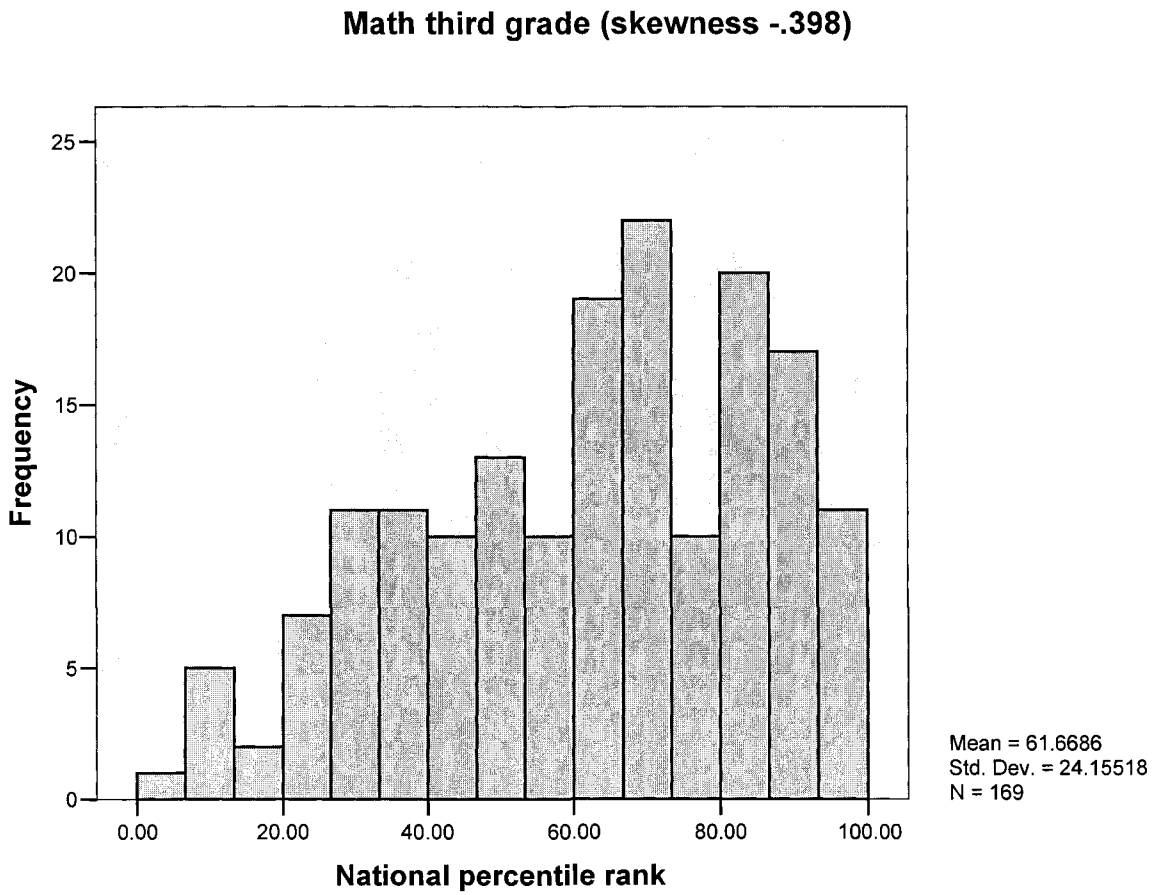
Appendix F

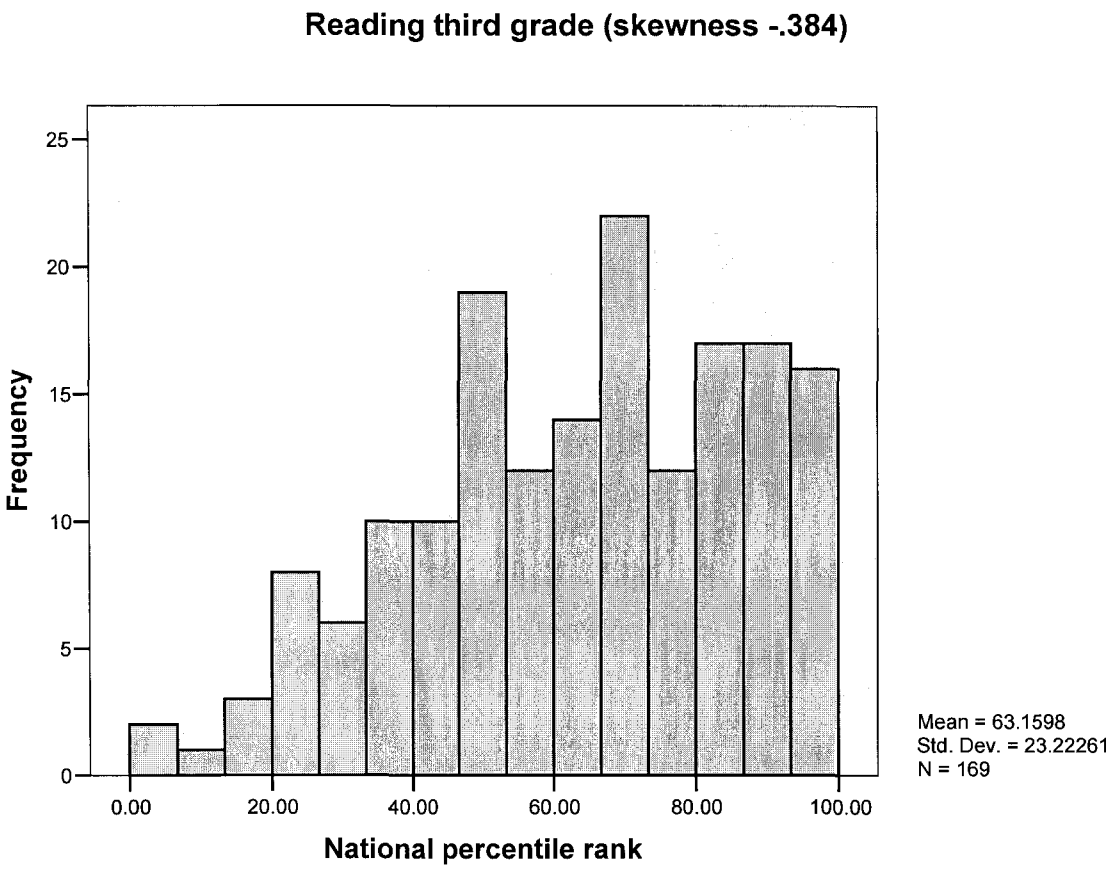
Mean national percentile rank and difference for year-round and traditional students

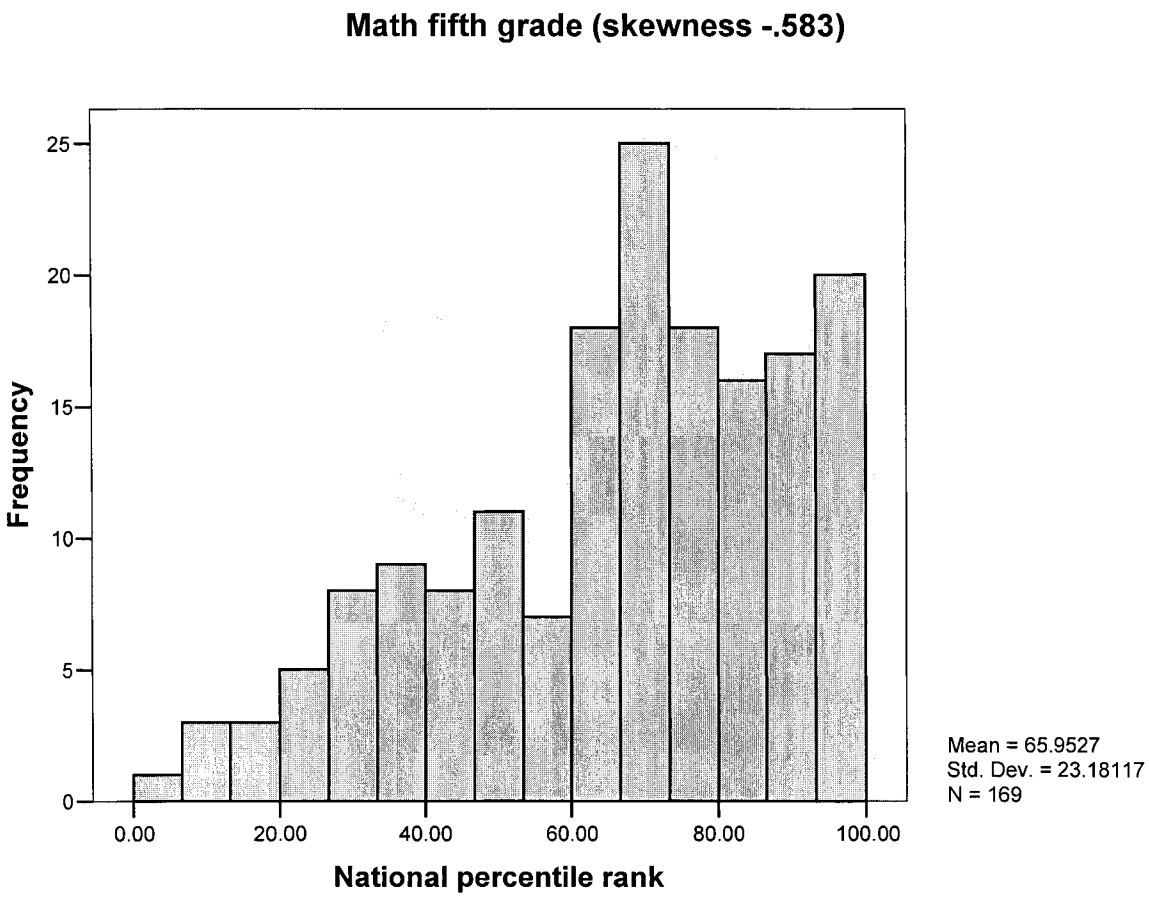
Score	Calendar	N	Mean	Standard Deviation	Standard Error Mean
Reading 5th grade national percentile	Traditional	95	61.2211	23.4090	2.4017
	Year-round	74	72.0270	21.5527	2.5055
Math 5th grade national percentile	Traditional	95	60.6316	22.7629	2.3354
	Year-round	74	67.2432	23.1652	2.6929
Reading difference*	Traditional	95	-.4316	13.8991	1.4260
	Year-round	74	1.3919	15.0668	1.7515
Math difference*	Traditional	95	2.6211	14.7937	1.5178
	Year-round	74	6.4189	14.7323	1.7126

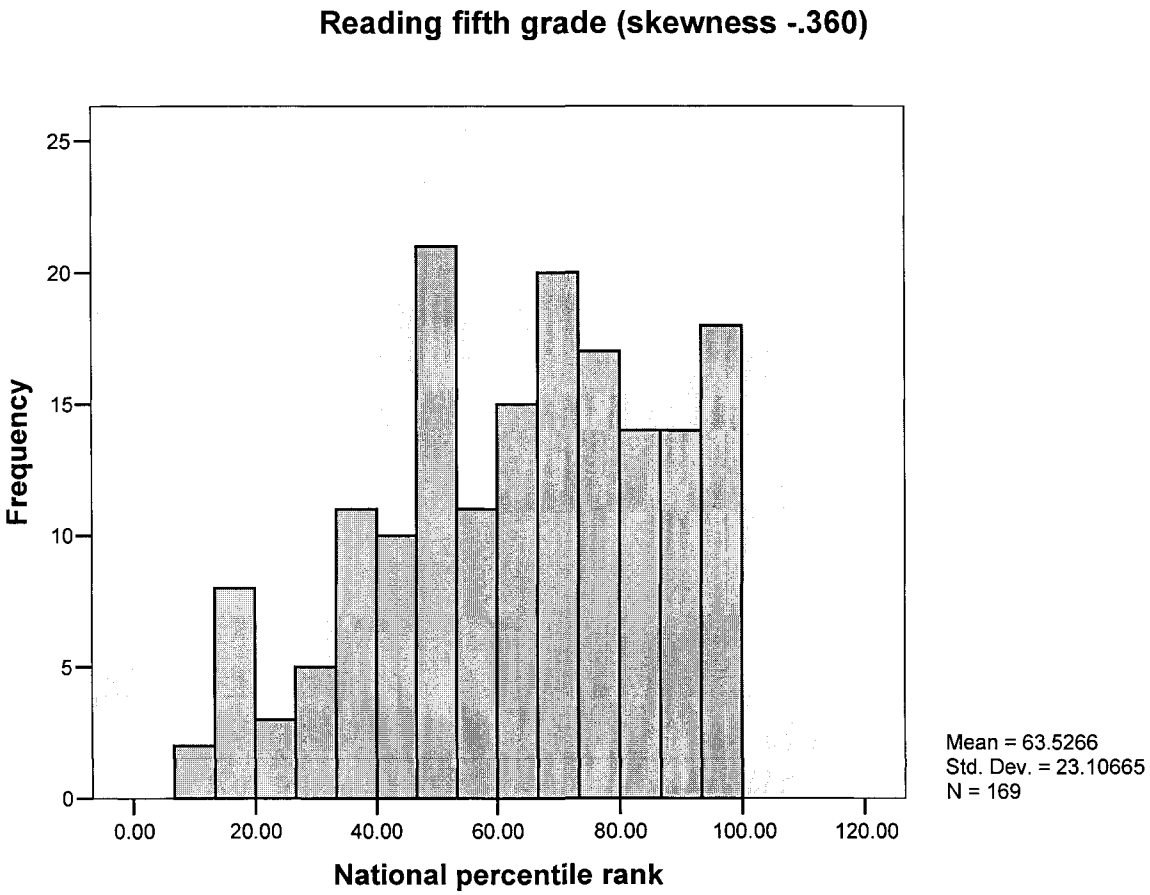
*difference variables calculated by subtracting third grade national percentile rank from fifth grade national percentile rank

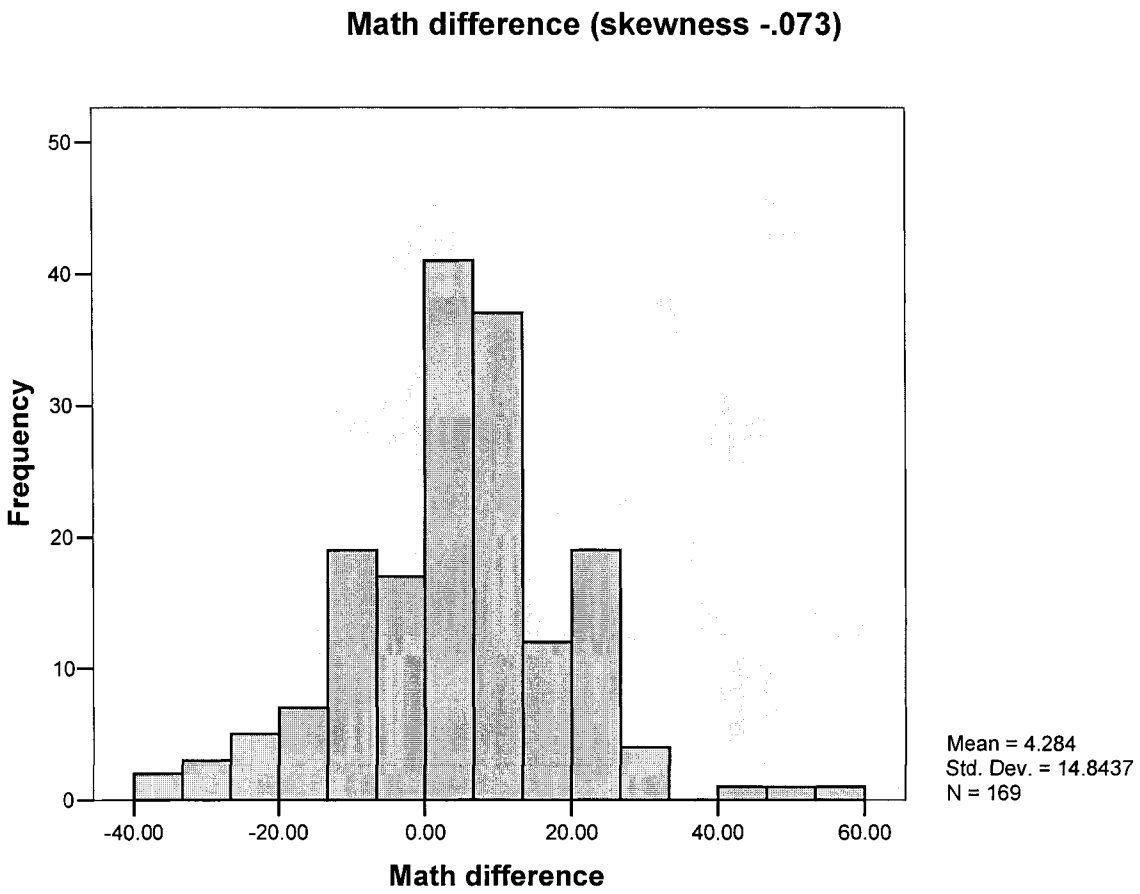
Appendix G

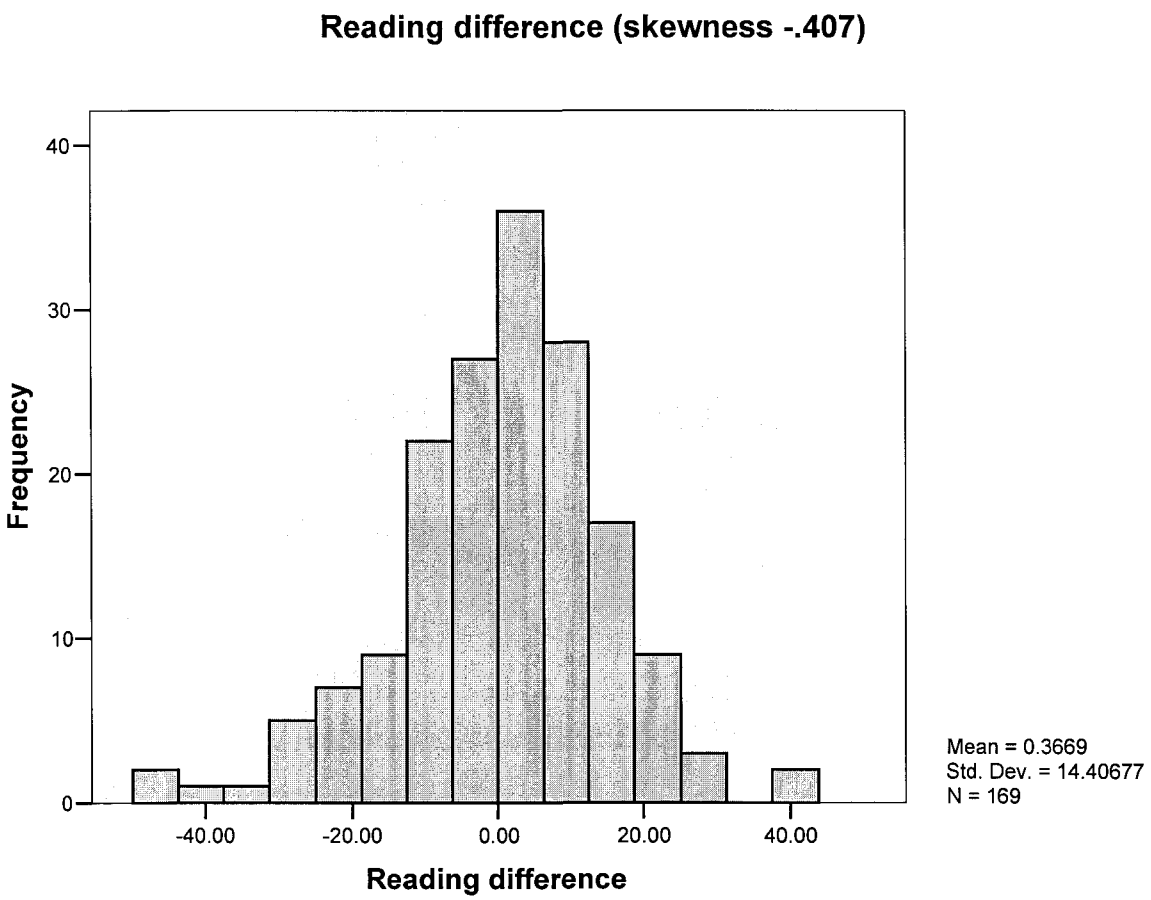

Math third grade (skewness -.398)
Frequency
25
20
15
10
5
0
0.00
20.00
40.00
60.00
80.00
100.00
National percentile rank
Mean = 61.6686
Std. Dev. = 24.15518
N = 169


Reading third grade (skewness -.384)
Frequency
25
20
15
10
5
0
0.00
20.00
40.00
60.00
80.00
100.00
National percentile rank
Mean = 63.1598
Std. Dev. = 23.22261
N = 169


Math fifth grade (skewness -.583)
Frequency
25
20
15
10
5
0
0.00
20.00
40.00
60.00
80.00
100.00
National percentile rank
Mean = 65.9527
Std. Dev. = 23.18117
N = 169


Reading fifth grade (skewness -.360)
Frequency
25
20
15
10
5
0
0.00
20.00
40.00
60.00
80.00
100.00
120.00
National percentile rank
Mean = 63.5266
Std. Dev. = 23.10665
N = 169


Math difference (skewness -.073)
Frequency
50
40
30
20
10
0
-40.00
-20.00
0.00
20.00
40.00
60.00
Math difference
Mean = 4.284
Std. Dev. = 14.8437
N = 169


Reading difference (skewness -.407)
Frequency
40
30
20
10
0
-40.00
-20.00
0.00
20.00
40.00
Reading difference
Mean = 0.3669
Std. Dev. = 14.40677
N = 169

Independent Samples T-test

	Levene's Test		T-test of Equality of Means						
								95% Confidence Interval	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Math	.894	.346	-3.082	167	.002	-10.8060	3.50661	-17.72898	-3.88297
Reading	.176	.675	-1.859	167	.065	-6.6117	3.55674	-13.63363	.41030
Math difference	.303	.583	-1.659	167	.099	-3.7979	2.28958	-8.31812	.72238
Reading difference	.038	.846	-.816	167	.416	-1.8235	2.23597	-6.23788	2.59094

Appendix I

Fifth grade math, national percentile rank
Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	52.307	<.001	.695	1.000
Intercept	38.768	<.001	.194	1.000
Math3	283.557	<.001	.638	1.000
School	8.001	<.001	.090	.953
Calendar	6.211	.014	.037	.698
Sex	1.316	.253	.008	.207
Program	.431	.512	.003	.100
Ethnicity	.118	.732	.001	.063

Computed using alpha = .05
R Squared = .695 (Adjusted R Squared = .681)

Estimated marginal means for calendar
for dependent variable fifth grade math national percentile rank

Calendar	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Traditional	61.882	2.226	57.486	66.279
Year-round	67.047	2.370	62.367	71.727

Appendix J

Fifth grade reading, national percentile rank

Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	52.533	<.001	.695	1.000
Intercept	15.090	<.001	.086	.971
Reading3	299.092	<.001	.650	1.000
School	10.276	<.001	.113	.986
Calendar	.642	.424	.004	.125
Sex	.939	.334	.006	.161
Program	1.641	.202	.010	.247
Ethnicity	.840	.361	.005	.149

Computed using alpha = .05
R Squared = .695 (Adjusted R Squared = .682)

Estimated marginal means for calendar
for dependent variable fifth grade reading national percentile rank

			95% Confidence Interval	
Calendar	Mean	Std. Error	Lower Bound	Upper Bound
Traditional	61.114	2.202	56.765	65.464
Year-round	62.759	2.361	58.096	67.421

Appendix K

Math difference

Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	7.878	<.001	.255	1.000
Intercept	38.768	<.001	.194	1.000
Math3	37.941	<.001	.191	1.000
School	8.001	<.001	.090	.953
Calendar	6.211	.014	.037	.698
Sex	1.316	.253	.008	.207
Program	.431	.512	.003	.100
Ethnicity	.118	.732	.001	.063

Computed using alpha = .05
R Squared = .255 (Adjusted R Squared = .223)

Estimated marginal means for calendar
for dependent variable math difference

Calendar	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Traditional	.214	2.226	-4.183	4.610
Year-round	5.379	2.370	.699	10.059

Appendix L

Reading difference

Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	6.363	<.001	.217	1.000
Intercept	15.090	<.001	.086	.971
Reading3	23.525	<.001	.127	.998
School	10.276	<.001	.113	.986
Calendar	.642	.424	.004	.125
Sex	.939	.334	.006	.161
Program	1.641	.202	.010	.247
Ethnicity	.840	.361	.005	.149

Computed using alpha = .05
R Squared = .217 (Adjusted R Squared = .183)

Estimated marginal means for calendar for dependent variable reading difference

Calendar	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Traditional	-2.046	2.202	-6.395	2.304
Year-round	-0.401	2.361	-5.063	4.261

Appendix M

Fifth grade math, national percentile rank (including free/reduced lunch) Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	9.418	<.001	.921	1.000
Intercept	1839.729	<.001	.976	1.000
Math3	6.872	<.001	.890	1.000
School	13.022	.001	.221	.942
Calendar	4.137	.047	.083	.516
Free/reduced lunch	.450	.506	.010	.101

Computed using alpha = .05
R Squared = .921(Adjusted R Squared = .489)

Estimated marginal means for calendar for dependent variable fifth grade math national percentile rank

			95% Confidence Interval	
Calendar	Mean	Std. Error	Lower Bound	Upper Bound
Traditional	55.993	1.877	52.214	59.772
Year-round	61.683	2.029	57.599	65.767

Appendix N

Fifth grade reading, national percentile rank (including free/reduced lunch) Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	8.824	<.001	.893	1.000
Intercept	2214.296	<.001	.977	1.000
Reading3	8.056	<.001	.877	1.000
School	.746	.392	.014	.136
Calendar	.714	.402	.013	.132
Free/reduced lunch	.218	.642	.004	.074

Computed using alpha = .05
R Squared = .893 (Adjusted R Squared = .792)

Estimated marginal means for calendar for dependent variable fifth grade reading, national percentile rank

Calendar	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Traditional	65.409	2.227	60.941	69.877
Year-round	68.156	2.087	63.971	72.342

Appendix O

Math difference (including free/reduced lunch)
Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	2.732	<.001	.772	1.000
Intercept	.815	.371	.017	.143
Math3	2.560	.001	.750	1.000
School	13.022	.001	.221	.942
Calendar	4.173	.047	.083	.516
Free/reduced lunch	.450	.506	.010	.101

Computed using alpha = .05
R Squared = .772 (Adjusted R Squared = .489)

Estimated marginal means for calendar
for dependent variable math difference (including free/reduced lunch)

Calendar	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Traditional	-1.607	1.877	-5.386	2.172
Year-round	4.083	2.029	-.001	8.167

Appendix P

Reading difference (including free/reduced lunch)
Test of between-subjects effects

Source	F	Sig.	Partial Eta Squared	Observed Power
Corrected Model	1.867	.013	.638	.993
Intercept	12.889	.001	.196	.941
Reading3	8.056	<.001	.610	1.000
School	.746	.392	.014	.136
Calendar	.714	.402	.013	.132
Free/reduced lunch	.218	.642	.004	.074

Computed using alpha = .05
R Squared = .638 (Adjusted R Squared = .296)

Estimated marginal means for calendar
for dependent variable reading difference (including free/reduced lunch)

Calendar	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Traditional	3.722	2.227	-.746	8.189
Year-round	6.469	2.087	2.283	10.655

Appendix Q

As I contacted schools across the United States to find schools meeting the criteria for this study, I had the opportunity to visit with educators with a wealth of experience in year-round education. While these informal conversations were not relevant to this study, the common themes from these conversations may prove valuable for future research. These conversations were not qualitatively analyzed, but the following impressions were gathered. The comments are not attributed to individuals or their schools because they were not participants in a study.

Most of the schools I talked with identified academic achievement as their primary goal when implementing a year-round calendar. However, with little solid research to support this goal, most also cited consumer choice in their rational for implementing the program. All schools contacted were well-aware of the lack of research in the area of academic achievement in year-round schools and supported additional research. Many sounded anxious when considering the possibility of participating in a study using their school's data. These were passionate supporters of year-round education that had worked diligently to build their programs. Trust needed to be built regarding the quality of the study and the abilities of the researcher.

Several of the schools contacted had implemented a school-within-a-school program for a couple of years and then ended the program. A few saw the program grow to the point that the entire school adopted a year-round calendar, while other returned to a traditional calendar. The primary reason for returning to a traditional calendar was the tremendous strain on the building principal. In a school-within-a-school setting the building principal has little or no "down time" and frequently is required to complete administrative tasks twice, once for

the year-round calendar and once for the traditional calendar. Often times master schedules are created for times that only one calendar is in session and another when all students are in session. In most cases the building principal was also responsible for planning and implementing intersessions for the year-round students. In one school administering the school-within-a-school year-round program became so overwhelming that principals rotated through the assignment each year. In other cases the situation became so overwhelming that the program was discontinued.

There are so few elementary school-within-a-school year-round programs that these schools feel very disconnected from not only a traditional calendar, but even the more common year-round calendar structures. One very rewarding outgrowth of this project was connecting the sixteen school-within-a-school year-round programs across the United States. This will allow for continued networking, brainstorming, and problem-solving.

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