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IMPACT OF FOUR-DAY SCHOOL WEEK ON PRIMARY GRADE STUDENT  
ACHIEVEMENT

by

Colby Clinton Gull

A dissertation

submitted in partial fulfillment

of the requirements for the degree of

Doctor of Education

Idaho State University

Spring 2016

## **Committee Approval**

To the Graduate Faculty:

The members of the committee appointed to examine the Dissertation of Colby Gull find it satisfactory and recommend that it be accepted.

---

Dr. Mark Neill,  
Major Advisor

---

Dr. Gary Storie,  
Committee Member

---

Dr. Peter Denner,  
Committee Member

---

Dr. Patti Mortensen,  
Committee Member

---

Dr. Kenneth Khang,  
Graduate Faculty Representative

# Idaho State UNIVERSITY

Office for Research Integrity  
921 South 8th Avenue, Stop 8046 • Pocatello, Idaho 83209-8046

September 1, 2015

Colby Gull  
P.O. Box 1090  
126 N. Franklin  
Lyman, WO 82937

RE: Regarding study number IRB-FY2016-57: Impact of Four-Day School Week on Primary Grade Student Achievement

Dear Mr. Gull:

This message is your official notification that your project/survey IRB-FY2016-57: Impact of Four-Day School Week on Primary Grade Student Achievement does not meet the definition of research under the Code of Federal Regulations Title 45 Part 46.102(d); therefore is not subject to review by the Institutional Review Board.

Sincerely,

Ralph Baergen, PhD, MPH, CIP  
Human Subjects Chair

## **DEDICATION**

This work is dedicated, first of all, to Marsha Gull for her love and support. And to my children, Isaac, Adalyn, Dimick, Emily, and Alexander who are my exemplars of goodness.

## **ACKNOWLEDGEMENTS**

It has been a long and bumpy ride to get this far in my education. I am the first member of my family to ever earn a bachelor's degree, now I am completing my doctoral work. My good wife, Marsha, has been with me through four degrees now. She has served as mentor, editor, sounding board, but mostly as friend and cheerleader. I love her with all of my heart and know that she is a primary reason for me being where I am today. In addition to Marsha I have five wonderful little cheerleaders at home whose prayers and support allowed me to finally finish this long process.

I cannot express my deep gratitude to Dr. Mark Neill for pushing me to achieve my potential. For him, nothing was ever good enough, and that has made all of the difference in my writing and in my work. We did not always see eye to eye, and we started our relationship a bit at odds. I believe we have now achieved a level of professional camaraderie and, I hope, friendship.

At the risk of sounding cliché I also need to thank my Heavenly Father for His hand in my becoming. It is through His love, and the grace of Jesus Christ that I can overcome, and become who I need to be. Phillippians 4:13.

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## **ABSTRACT**

There is little empirical research regarding the impact the four-day per week school schedule has on primary grade student achievement. Early literacy and numeracy skills are essential functions that provide the basis for success in the American public education system and a global economy. Any school schedule that adversely affects mastery of these essential functions in early grades put students' success at unnecessary risk.

The purpose of this study was to determine whether a statistically significant difference in primary grade student achievement existed between four-day per week schools and five-day per week schools. Northwest Evaluation Association Measure of Academic Progress (MAP) and Measure of Academic Progress for Primary Grades (MPG) was used to measure the reading and mathematics achievement of students in first through third grades in Colorado, Montana, and Wyoming. This study was conducted because a careful review of related literature revealed that the impact of the four-day per week school schedule on student achievement in primary grades had not been conducted.

A matched-pairs design was employed in this study and paired-samples t-tests were conducted to address the research questions that guided this study. Schools were matched based on the state in which the schools were located, the grade-level enrollment of each school, and the free and reduced lunch data from each school. In addition to determining the impact on student achievement the impact of the four-day per week

schedule on average daily attendance was examined. All schools in the study were required to use the MAP or MPG to assess student achievement.

For all matched pairs the students in five-day per week schools reported higher mean RIT scores than the students in four-day per week schools, however, the only statistically significant difference identified was in second grade reading and mathematics scores. The effect size of the four-day per week school schedule varied from .23 to .68. It appeared from the data analysis that the four-day per week school schedule may negatively impact student achievement in primary grades.

## **CHAPTER I**

### **Introduction**

Literacy and numeracy skills are some of the most important foundational skills required of students in the American system of modern education. These skills not only provide the basis of learning in k-12 education, they are also major predictors of success after high school (Fiester & Smith, 2010; Flawn, 2008; Lesnick, Goerge, Smithgall, & Gwynne, 2010). It is important for schools to measure student academic outcomes using consistent and objective measures of growth and achievement. Assessment data are used to answer educational questions about growth and achievement (Northwest Evaluation Association, 2014a).

Reading proficiently by the end of third grade can be a make it or break it benchmark in a child's educational development (Hernandez, 2010). Educators use quality assessment tools to measure students' learning and achievement as they progress through the elementary grades (Northwest Evaluation Association, 2014b). Up until the end of third grade most children are learning to read. Beginning in fourth grade they begin reading to learn (Hernandez, 2010). Students use literacy skills to obtain more information in academic subjects such as math, science, and social studies. Without early foundational literacy skills students' ability to achieve in later grades will be greatly impeded (Barton, Heideman, & Jordan, 2002; Hernandez, 2010). The fact is the majority

of the fourth grade curriculum is incomprehensible to students who do not have the reading skills sufficient for fourth grade (Hernandez, 2010).

Reading is not the only gateway skill for early grade learners as a predictor of later educational and career success. The development of numeracy skills early in a child's education experience may be an even greater predictor of later success, not only in math, but other academic skill areas (Education Commission, 2013). Researchers assert that the most important factor in predicting later academic achievement is children entering school with mastery of early literacy and numeracy skills (Duncan et al., 2007).

There is evidence to suggest that students who scored at or above proficient in grade three reading are more likely to graduate from high school and go on to attend college than their below proficient peers (Fiester & Smith, 2010; Lesnick, Goerge, Smithgall, & Gwynne, 2010). Research also supports the conclusion that those who drop out of high school are less likely to find a job and will make substantially less money than those who finish high school and receive at least some type of post-secondary training (Bowers, 2010; Fiester & Smith, 2010; Sum, Khatiwada, McLaughlin, & Palma, 2009). It is, therefore, imperative that educators do all they can to assist students in mastering literacy and numeracy skills in the early grades so these students have the requisite skills to be successful in subsequent grades and post-secondary education (Northwest Evaluation Association, 2014a)

Other factors that impact a student's mastery of literacy and numeracy skills are student attendance and classroom instructional time. When students are in school regularly they are more likely to achieve higher levels of mastery of literacy and numeracy skills (Chang & Romero, 2008). Students who receive quality instruction

throughout the school day and school year are more likely to master literacy and numeracy skills (Chang & Romero, 2008). Increasing instructional time for students has a real, but small impact on student learning when the instruction is provided by a certified teacher (Kidron & Lindsay, 2014).

Educators and students need to understand clearly the content students should know and the practices students should be able to perform at each grade level (Silver, 2004). Academic standards provide a clear focus to support each student's academic success. The standards-based reform movement is founded upon the assumption that higher standards are at the heart of school improvement and student academic success (Silver, 2004). Standards-based reform is just one of the reform movements of the second half of the twentieth century (Borman, Hewes, & Brown, 2002).

There has been a cycle of reforms that, like a pendulum, has moved from one trend to another with little evidence of truly improving students' academic outcomes (Borman, Hewes, & Brown, 2002). Generally, major education reforms are aimed at increasing student proficiency. Some educational innovations, such as a four-day school week, are implemented for other reasons, such as saving money (Donnis-Keller & Silvernail, 2009) or reducing the amount of instructional time lost for extra-curricular activities (Chamberlain & Plucker, 2003).

Many school districts throughout the United States have adopted the four-day school week. The National Council of State Legislators (2014) report that at least twenty-one states including Arizona, California, Colorado, Georgia, Idaho, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, Nevada, Oklahoma, Oregon, South Dakota, Utah, Wisconsin, and Wyoming, and nearly 290

school districts in the United States (Layton, 2011) have adopted the four-day school week. Most of the school districts that operate on a four-day schedule are small, serving fewer than 1,000 students, and rural. Many of the students in these schools have long bus rides before and after school each day and have long distances to travel to participate in extra-curricular activities (Chamberlain & Plucker, 2003).

One of the first school districts to change to the four-day week was Cimarron School District in Cimarron, New Mexico. One of the major reasons Cimarron changed to the four-day schedule was the energy crisis that occurred in the 1970s. Faced with reduced state and local revenue and increased energy costs, school district leaders looked for ways to save money. By reducing the number of days that students were required to attend school the district administration believed it could reduce the cost of fuel for transportation and energy for heating and cooling buildings (Donnis-Keller & Silvernail, 2009). Ultimately, the school administration in Cimarron, New Mexico realized about a 2% total savings to the school district's budget (Feaster, 2002).

Financial savings (Donnis-Keller & Silvernail, 2009), athletic scheduling (Chamberlain & Plucker 2003; Koki, 1992), and retaining teachers (Koki, 1992) were some of the reasons that local school districts considered when deciding to make a change to the four-day school week. School district officials claimed that some savings have been realized by reducing transportation, food service, and energy costs (Chamberlain & Plucker, 2003; Dam, 2006; Darden, 2008; Donnis-Keller & Silvernail, 2009; Gaines, 2008).

Chamberlain and Plucker (2003) noted that some of the unexpected benefits of the four-day school week included improved staff morale and better student and teacher

attendance. Dam (2006) reported higher stakeholder satisfaction following the adoption of the four-day week. However, currently the evidence of the impacts of the four-day school week on student achievement is inconclusive (Donnis-Keller & Silvernail, 2009).

In an attempt to provide some data regarding the impact of the four-day school week on primary grade student achievement in math and reading, this study compared achievement of students in grades 1-3 that attended four-day per week schools with achievement of students in grades 1-3 that attended traditional five-day per week schools. Data were collected and analyzed for students in first through third grade. Because of the documented long-term impact of literacy and numeracy skills, this study focused on the collection and analysis of reading and math achievement data.

The Measure of Academic Progress (MAP) and Measure of Academic Progress for Primary Grades (MPG) served as the data source for this study. The MAP/MPG was administered at least twice each year for all students in Wyoming in first through eighth grade. Some school districts also used the MAP/MPG to assess kindergarten students reading and math achievement.

In Colorado, school districts were not required to administer the MAP/MPG assessment. Rather, they were given the option of administering locally adopted assessments based on individual school districts' needs. There were several school districts in Colorado that used the MAP/MPG to measure student achievement; including those school districts invited to participate in this study (M. Allen, personal communication, February 26, 2015).

Montana schools had the option of assessing student learning using locally adopted assessments. There is no statewide requirement to administer MAP/MPG in



Montana. There were several school districts in Montana that use MAP/MPG to measure student achievement (S. Furois, personal communication, June 19, 2015), including those school districts invited to participate in this study. The MAP/MPG assessment was used in Montana to determine students' proficiency in reading, writing, math, and science. However, this study focused only on student achievement in reading and math.

The MAP/MPG is a computerized adaptive test that adjusts the difficulty of the questions to the level of the student's ability. If a student answered a question incorrectly, the computer provided an easier question for the student to attempt next. If a student answered a question correctly, then the computer selected a more difficult question for the student to attempt (Northwest Evaluation Association, 2014b).

### **Problem Statement**

This study considered the impact of the four-day school week on first through third grade students' reading and math achievement compared with the first through third grade students' reading and math achievement of students enrolled in traditional five-day school week schools.

The following seven research questions guided this study.

1. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school?
2. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between second grade students attending

a four-day per week school and second grade students attending a traditional five-day per week school?

3. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school?
4. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school?
5. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school?
6. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school?
7. Is there a statistically significant difference between school-wide average daily attendance in four-day per week schools and five-day per week schools?

The null hypothesis for each of these research questions include:

1. There is no statistically significant difference in reading achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school.
2. There is no statistically significant difference in reading achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school.
3. There is no statistically significant difference in reading achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school.
4. There is no statistically significant difference in math achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school.
5. There is no statistically significant difference in math achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school.
6. There is no statistically significant difference in math achievement as measured by the MAP/MPG between third grade students attending a

four-day per week school and third grade students attending a traditional five-day per week school.

7. There is no statistically significant difference in average daily attendance between four-day per week schools and five-day per week schools.

### **Definitions**

The four-day school week was defined by each school or school district that has chosen to hold mandatory school sessions for only four days each week. Traditional five-day calendars are made up of five days each week and include mandatory classes Monday through Friday. Four-day school weeks can include Monday through Thursday with no mandatory classes on Friday. Four-day school weeks may also eliminate other days of the week, sometimes Monday or occasionally Wednesday (Donnis-Keller & Silvernail, 2009).

In some school systems the day students were not in attendance was used for the professional development of teachers. In other school districts the non-instructional day was a time for student remediation; giving students a chance to make up work they had missed or master concepts that students had not mastered. Other school districts used the non-instructional day as a day off from school with no professional responsibilities for teachers or academic responsibilities for students (Donnis-Keller & Silvernail, 2009). The use of the non-instructional day was not investigated during this study.

Attendance was defined as being physically present in school. The Wyoming Department of Education (WDE) required that elementary school staff take attendance twice each school day, once in the morning and once in the afternoon. (Wyoming School Foundation Rules, n.d.).

The Colorado Department of Education required that school staff take attendance twice each school day (Code of Colorado Regulations, 301-78). Montana does not have a specific requirement for daily attendance collection. School districts across Montana may have different definitions of attendance than does the Montana Office of Public Instruction. Therefore, there may have been inconsistency in attendance data reporting for any schools from Montana (B, Marlow, personal communication, June 19, 2015). For purposes of this study attendance was defined as being physically present in class.

For purposes of this study, the average daily attendance rates were collected and analyzed to determine if average daily attendance was a contributing factor to any differences in student achievement between four-day per week schools and five-day per week schools. The data was collected by contacting each individual school that was invited to participate in this study.

For purposes of this study, the Measures of Academic Progress (MAP) referred to the MAP for grades 2-12 and the Measures of Academic Progress for Primary Grades (MPG) for kindergarten through grade two. While the MAP may have been administered to students in second through twelfth grade MAP scores for second and third graders were the only scores used in this study. MPG scores were used for first graders. Both assessments were computer adaptive interim assessments used to assess reading, language usage, and mathematics.

### **Assumptions, Delimitations, Limitations**

**Assumptions.** It was assumed that the schools or school districts included in this study met at least the minimum number of required school days, the minimum number of instructional hours, or had an alternative calendar that had been approved by the

respective State Boards of Education; the Wyoming State Board of Education, the Colorado State Board of Education, or the Montana Office of Public instruction.

All Wyoming schools were required to hold school sessions of at least 175 days each school year unless they had an alternative calendar approved by the Wyoming State Board of Education. Any school district in the state of Wyoming that operated on a four-day school week must have received approval from the Wyoming State Board of Education at least once every other year (Wyoming Statute, 21-2-304, 2012).

Colorado elementary schools were required to be in session for 968 hours per year for students in first through sixth grade. In addition, schools must hold classes for at least 160 days unless they have prior authorization from the Commission of Education (Colorado Statute, 22-33-104). Schools in Montana were required to provide instruction to students in grades one through three for a minimum of 720 hours each year (Montana Code Annotated, 20-1-301).

It was also assumed that the teachers in the schools and school districts included in the study met the federal definition of highly qualified. According to the United States Department of Education (USDE) in order to be highly qualified a teacher must have held a bachelor's degree, obtained full state certification or licensure, and have provided evidence of subject or grade-level competency (No Child Left Behind, 2009). Teachers could demonstrate subject level competency by holding a major from a college or university in the subject they teach, have earned twenty-seven post-secondary education credits in the subject they teach, have passed a state-developed content-specific test, held an advanced certification from the state in which they teach, or have earned a graduate degree in the content area in which they teach. Teachers who taught prior to 2004 could

also demonstrate competency by using a High Objective Uniform State Standard of Evaluation (HOUSSE) rubric (No Child Left Behind, 2009). This rubric was used to document teaching experience, professional development and content knowledge garnered over time in the subject area (No Child Left Behind Act, 2004).

It was assumed that all school personnel followed the testing protocol for the MAP/MPG assessment as established by the Northwest Evaluation Association (NWEA). Northwest Evaluation Association has developed a technical manual to provide guidance for teachers who were responsible for administering the MAP/MPG assessment. In order for the MAP/MPG to be a valid and reliable measure of student achievement each teacher administering the assessment must follow the protocols in the manual. The methods for administering the assessment, as well as protocols for providing acceptable accommodations were detailed in the manual (MAP Technical Manual, 2011).

It was assumed that the MAP/MPG assessment was aligned to Common Core State Standards. According to NWEA, the MAP and MPG are aligned to Common Core State Standards. NWEA has conducted studies to demonstrate this alignment (Northwest Evaluation Association, 2013).

It was assumed that teachers in the schools and school districts included in this study were teaching to the Common Core State Standards. In June of 2012, the State of Wyoming adopted the Common Core State Standards (CCSS) for English language arts and mathematics. Wyoming calls the CCSS the Wyoming Content and Performance Standards. When the standards were renamed the Wyoming Content and Performance Standards there were no changes made to the original CCSS. As of the 2012-13 school year, teachers in Wyoming were expected to adhere to the Wyoming Content and

Performance Standards, also known as Common Core State Standards (Wyoming Department of Education, 2014a).

The Colorado State Board of Education adopted the Common Core State Standards in August of 2010. The English language arts (ELA) and math standards were not changed from the original Common Core ELA and math standards when they were adopted by Colorado (Colorado Department of Education, 2014). The Colorado Student Assessment Program (CSAP) was implemented in 1997. With the adoption of Common Core State Standards in English language arts and mathematics, a new accountability system was designed. In addition to the statewide assessment for student achievement, school districts in Colorado had been given local decision-making authority regarding which assessment students took. The schools in this study participated in MAP/MPG as part of the Colorado Measures of Academic Success program.

Montana adopted the Common Core State Standards in English language arts and mathematics in November 2011. The standards were not changed from the original ELA and math standards when they were adopted by Montana (Montana Office of Public Instruction, 2014).

It was assumed that the students were prepared to take the MAP/MPG test when the test is administered. In the State of Wyoming, the MAP/MPG assessment is administered at least twice each year, once in the fall and again in the spring. In 2015, the year that data for this study was collected, the fall testing window began on August 15 and was open until November 30. All students who took the MAP/MPG assessment must have taken the assessment within the designated time frame. In 2015, the year that data for this study was collected, the spring testing window for MAP/MPG in Wyoming was



March 1 through June 15 (Wyoming Department of Education, 2014b). All students who were to take the MAP/MPG assessment took the assessment within the designated time frame. Some school districts in Wyoming also administered the MAP/MPG assessment in the winter. There was no specific testing window established by the Wyoming Department of Education for the winter administration of MAP/MPG (Wyoming Department of Education, 2014b). All students in first through eighth grade were required to take a common assessment that established benchmark growth for students. In Wyoming this assessment was the MAP/MPG (Wyoming Statute, 21-2-204, 2012).

The Colorado Department of Education (CDE) did not have any requirements for MAP/MPG testing. The Colorado Measures of Academic Success (CMAS) was an assessment system that Colorado used to determine academic proficiency in English language arts (ELA), mathematics, science, and social studies of students in third through twelfth grade. The Partnership for Assessment of Readiness for College and Careers (PARCC) test was a part of the CMAS system as well as the Colorado ACT (Colorado Department of Education, 2015). According to a representative of the Colorado Department of Education, individual school districts can add additional assessments, such as MAP/MPG at their discretion (M. Allen, personal communication, February 26, 2015).

In Montana the Smarter Balanced Assessment was administered during the 2014-2015 school year as part of the Montana Comprehensive Assessment System (Snow, 2016). A spokesperson for the Montana Office of Public Instruction noted that in addition to the components of SBA, some school districts have elected to use the MAP/MPG assessment in their schools (Y. Field, personal communication, June 19, 2015).

It was assumed that the students taking the MAP/MPG assessment knew how to take a standardized test. The MAP/MPG assessment is a multiple-choice test and students were expected to have received some prior instruction and background information for completing multiple-choice tests.

It was assumed that students had the requisite computer skills to take the MAP/MPG assessment. Students must be able to use a mouse to navigate through the assessment. By the time of the spring testing window, first grade students were expected to have mastered these skills.

It was assumed that students taking the MAP/MPG test were doing so in good faith. Most school districts in Colorado, Montana, and Wyoming do not use MAP/MPG results to determine a student's final class grade. The assessment was designed to measure student growth and not to provide rationale for retention or advancement to the next grade. There were no negative consequences to students who did poorly on the assessment on purpose. It was assumed that the students taking the MAP or MPG assessment would perform to the best of their ability on the respective assessment.

Generally, school district officials do not collect free and reduced lunch data by grade level. This data was collected for entire schools and school districts. It was assumed that school-wide free and reduced lunch data was reflective of grade-level free and reduced lunch data.

Average daily attendance was collected on a school-wide basis. School leaders do not collect average daily attendance data for specific grades. It was assumed that school-wide average daily attendance would be reflective of grade-level average daily attendance.

**Delimitations.** Delimitations in this study were variables that were controlled by the researcher. The one variable that was controlled by the researcher in this study was the matching of schools and school districts. Schools were matched based on their location, grade-level enrollment numbers, and percent of students in the school eligible for free and reduced lunch (an indicator of socio-economic status). To be included in this study, these elementary schools must have had a minimum of five students enrolled in each of the first, second, and third grades during the spring of 2015. In addition, to be included in this study, elementary schools must have a reported free and/or reduced lunch count to their respective state department of education or office of public instruction during the 2014-2015 school year. Finally, to be included in this study, schools had to administer the MAP or MPG to students in the first, second, and third grades during the spring of 2015.

Another delimitation of this study was the focus on student achievement. Research has indicated that the four-day school week schedule has demonstrated an increase in student and teacher satisfaction with school and improved staff morale (Sagness & Salzman, 1993, Feaster, 2002). It was recognized that school satisfaction and employee morale impact the quality of education, however, these factors were not the focus of this study; and were, therefore, not investigated.

**Limitations.** Limitations were identified in this study as variables that fall outside of the control of the researcher. This study was limited by the class size of each school and school district participating in the study. Many of the school districts that operate on a four-day school week were rural and remote (Darden, 2008). Rural and remote districts often times have small numbers of students at each grade level. Small sample sizes have a

tendency to undermine the reliability of a study, hence, with few participants the generalizability of the study was limited (Myers, Well, & Lorch, 2010).

There was no set minimum number of hours for teacher contact hours with students in the state of Wyoming. One of the duties of the State Board of Education is to require schools to have 175 days of teacher/student contact time, or have an approved alternate calendar (Wyoming Statute, 21-2-304). School districts operating on a four-day school week may have different numbers of teacher-student contact hours imbedded in their school calendars. Even schools within the same state may have different number of instructional hours being provided to students. This limited the study because students in some districts may have received more instructional time than students in other districts.

In Colorado, students in elementary grades must have 990 hours of teacher contact time (Colorado Statute, 22-32-109). Schools in Montana are required to provide instruction to students in grades one through three for a minimum of 720 hours each year (Montana Code Annotated, 20-1-301, n.d.).

Some schools tested at the beginning of the testing window while other schools tested toward the end of the testing window. Those students who took the assessment toward the end of the testing window in each season had the opportunity to have received more instruction in each content area being assessed and would therefore be expected to have achieved higher scores on the assessment (Wyoming Department of Education, 2014c). There was not a statewide assessment window for MAP/MPG in Colorado and Montana; consequently, students in Colorado and Montana were given the MAP or MPG assessment at different times. Consequently, some students received more or less instruction prior to the assessment than did other students included in this study.

This study did not investigate how the four-day per week schools utilized the non-instructional day. Some districts used the non-instructional day for teacher training or student tutoring while other districts used the non-instructional day as a day off for teachers and students. The use of the non-instructional day may have impacted student outcomes. This study did not investigate the impact of the non-instructional day partially due to the limited number of participants, and the challenges associated with matched-pairs design.

The methodology used for recording student attendance was another limitation of this study. Wyoming (Wyoming Statute, 21-4-101, 2012) and Colorado (Colorado Statute, 22-33-104, 2006) had statewide definitions of attendance. Montana's definition of attendance varied from school district to school district (S. Furois, personal communication, June 19, 2015). Those schools invited to participate in this study reported their average daily attendance records as school personnel recorded them.

The number of schools that met all of the inclusion criteria and reported accurate data further limited this study. Some schools initially met the inclusion criteria but were later dropped from the study due to missing data. Other schools met all inclusion criteria and agreed to participate in the study but did not send any of the data required to complete the study.

Another limitation of the study was the inherent limitations of a matched-pairs design. Schools included in this study were matched based on school location (within the same state), grade-level enrollment, and free and reduced lunch count. Other factors that impacted the results of the study, but were not matching factors included the time during the testing window that the MAP/MPG was taken in each class and the amount of time

that each school had been operating on a four-day per week school week. Matching on some factors did not necessarily mean matching on all factors (Myers, Well, & Lorch, 2010).

### **Significance of the Study**

There is a significant lifelong impact of student mastery of literacy and numeracy skills in primary grades. Educational decision makers must determine how their decision to adopt the four-day school calendar may impact early grade student achievement in literacy and numeracy. School-wide reform efforts, including changes to the school calendar, may impact the learning of students in grades one through three. Consequently, decision makers must have all of the available information in order to make the best decisions for the children enrolled in their schools.

The existing research regarding the academic impact of the four-day school week on first, second, and third grade student achievement in reading and math was limited and inconclusive. It was therefore, imperative that decision makers have more empirical data collected from scientific research to guide curricular and schedule decisions. This study had a small sample size, and therefore lower power than desired. However, this investigation is the only study to examine the impact the four-day school schedule had on primary grade student achievement. So while the study was small, the study provided crucial information about the impact the school week had on primary grade learning for school board members, community members, school and district administrators, and other stakeholders as they consider implementing, or continuing to utilize, the four-day school week.

## **CHAPTER II**

### **Review of Literature**

The purpose of this study was to determine whether a statistically significant difference existed in reading and mathematics achievement of first through third grade students enrolled in four-day per schools and the reading and mathematics achievement of first through third grade students enrolled in five-day per week schools in Colorado, Montana, and Wyoming. There has been very little empirical research done on the effects of the four-day school week calendar on the achievement of younger students; in part due to the lack of standardized testing in younger grades.

Academic accountability has gained increased attention around the world. In the United States accountability practices and models have become the primary focus of both Republican and Democratic administrations at the federal level. President Bill Clinton issued his education reform package in the 1990s with an initiative titled Goals 2000 (Figlio & Loeb, 2011). That initiative was followed by one of the most noteworthy pieces of education legislation, the No Child Left Behind Act (NCLB) (Cross, 2015). In recent years, President Barack Obama joined the education accountability and reform ranks by introducing the Race to the Top initiative, one of the first competitive accountability models. All of the education accountability models in the United States have been aimed at increasing student achievement and closing the achievement gap through standardized testing mechanisms (Figlio & Loeb, 2011).

There are two models that have dominated most discussions regarding student achievement and school accountability. The first, called an in-status model, measures a school's performance based on the percentage of students achieving at a set level of proficiency on a given set of standards (Yu, Kennedy, Teddlie, & Crain, 2007). NCLB used an in-status model that required 100% of students to achieve proficiency in reading and math by 2014. However, the United States Department of Education (USDE) started granting waivers to individual states who develop their own accountability system. Many of these states used a student growth model, which is the second type of student accountability model (Figlio & Loeb, 2011).

Student growth models were used to determine the growth of individual students over a predetermined period of time. In these models, gain scores were used to determine whether or not students have improved their test performance from year to year. This measure can occur fall to fall, fall to spring, or spring to spring. The data from student growth models can be technically difficult for school personnel to interpret accurately and even more difficult to explain to parents (Yu et al., 2007).

The in-status and student growth models measured different outcomes and generate different objectives for schools and those who hold schools accountable for the academic progress of learners. Policy makers favored status-based systems because all student groups have the same targets. Schools, then, focused on bringing all students to at least this level of achievement. Student growth models, on the other hand, encouraged schools to focus on the growth of their students individually, regardless of a set of minimum standards. The student-growth model takes into account that where a student began his or her learning is partly responsible for the academic achievement level a



student attains at the end of a school year. This model was highly favored by some stakeholders, but viewed unfavorably by others. Some critics viewed student-growth models as a way for schools to be less transparent in their teaching processes. Other critics believe the student-growth model is a way for low performing schools to be let off the accountability hook. Whichever model is used, in-status or student-growth, the goal has been to provide schools and stakeholders with information about whether or not schools are meeting established expectations for either achievement or growth (Figlio & Loeb, 2011).

School accountability monitoring incentivizes schools to appear to be as effective as possible when compared to the chosen metric. Using this approach can tempt some educators to “teach to the test” or teach only those standards that will be assessed. This is not a bad option if the assessment system is designed to cover a broad range of material that is considered to be valuable to society. On the other hand, if the assessment system is designed to cover only a few, narrowly defined topics, those teachers who are teaching to the test are doing a disservice to the students they teach and to society (Figlio & Loeb, 2011).

Standardized tests will continue to be a topic of debate among educational stakeholders. These stakeholders play an important role in creating effective curricula that meet the needs of individual students, the system as a whole, and the greater community. School personnel must find a way to use standardized test scores to assess and improve curriculum, instructional practices, and enhance learning opportunities for students (Edwards, 2006).

Historically, states across the nation have adopted their own tests. In recent years, with the adoption of the Common Core State Standards, states have found merit in having assessments that are common across state boundaries. The two most commonly adopted summative standardized tests are the Smarter Balanced Assessment Consortium (SBA) and the Partnership for Assessment of Readiness for College and Careers (PARCC). These assessments were designed to measure student achievement of the Common Core State Standards. In 2014, 42% of students in the United States took one of these two assessments (Gewertz, 2014).

The Northwest Evaluation Association (NWEA) is an assessment vendor that also creates tests that are designed to measure student mastery of the Common Core State Standards. The Measures of Academic Progress (MAP) and Measures of Academic Progress for Early Grades (MPG) are computer generated adaptive interim assessments. This assessment was given to all Wyoming students in first through eighth grades (Wyoming Department of Education, 2014d). According to a representative of the Colorado Department of Education some school districts in Colorado administered the MAP/MPG to students as well, though not every student in the state takes the assessment (M. Allen, personal communication, February 26, 2015). Similarly, a representative of the Montana Office of Public Instruction reported that there were schools in Montana that have chosen to use the MAP/MPG as an assessment resource, but not all students took the assessment (S. Furois, personal communication, June 19, 2015).

Based on student responses, the MAP/MPG computer program adjusts the difficulty of the questions throughout the assessment. For example, if a student answers a question correctly the next question presented will be more challenging. Conversely, if a

student answers a question incorrectly the subsequent question will be less difficult. This allows the MAP/MPG assessment to quickly determine the academic skills that a student has or has not mastered (Northwest Evaluation Association, 2014a).

The MAP/MPG was designed to provide teachers, students, and parents with an accurate measure of student progress toward the mastery of basic skills. If the MAP/MPG was administered at recognized intervals over time the assessment should provide data regarding whether or not an individual student or an entire class has made satisfactory progress toward mastery of basic academic skills. Because the MAP/MPG is a computer generated adaptive test students were expected to answer about half of the questions on the MAP/MPG assessment correctly and half incorrectly. The final score was an estimate of the level of achievement for the student who took the assessment (Northwest Evaluation Association Teacher, 2004).

The Wyoming Accountability in Education Act (Wyoming Statute, 21-2-304, 2012) requires the Wyoming State Board of Education, through the Wyoming Department of Education, to develop a statewide education accountability system. As part of that system, the Wyoming State Board of Education requires school districts to administer a common benchmark adaptive assessment in first through eighth grades (Wyoming Statute, 21-2-304, 2012). This requirement does not exist in Colorado or Montana but school district leaders can choose to administer assessments such as MAP/MPG.

In the State of Wyoming, the MAP/MPG assessment was administered at least twice each year, once in the fall and again in the spring. (Wyoming Department of Education, 2014c). All students in first through eighth grade were required to take an

assessment that is common and established growth benchmarks for student achievement. In Wyoming, this assessment was the MAP/MPG (Wyoming Statute, 21-2-304, 2012).

Some school leaders in Colorado have opted to use the MAP/MPG to measure student growth. The MAP/MPG was not required in Montana. Some school leaders in Montana have opted to use MAP/MPG as a measure of student growth.

In Wyoming there was a common testing window established each year. All students in Wyoming must take the MAP/MPG within this testing window (Wyoming Department of Education, 2014c). Representatives of the Colorado Department of Education and Montana Office of Public Instruction reported that there was no statewide testing window established in Colorado (M. Allen, personal communication, February 26, 2015) or Montana (S. Furois, personal communication, June 19, 2015).

### **Early Literacy and Numeracy Skills**

Research has provided support for the position that early literacy skills have a positive impact on other educational outcomes (LeFevre, Polyzoi, Skwarchuk, Fast, & Sowinski, 2010). Literacy has been regarded as one of the most important skills students acquire as they progress through their formal k-12 education. Literacy is a foundational skill for other core academic subjects. Mastery of literacy skills allows students to read for the purpose of learning, for recreation, and to more fully participate in community and societal activities (Mullis, Martin, Kennedy, Trong, & Sainsbury, 2011).

Literacy was not the only early academic skill that influenced later school success. Early numeracy skills also played a pivotal role in the later academic and career success of students. Just as with literacy skills, students who had difficulty mastering early numeracy skills can experience later complications in multiple academic areas

(Morin & Franks, 2010). Some research indicated that numeracy was a predictor, not only of later mathematical success in school, but also a predictor of literacy success in school (Perry, 2000).

Landerl and Moll (2010) asserted the co-morbidity of reading difficulties and mathematical difficulties. Between 11% and 56% of children who demonstrated reading problems also demonstrated problems mathematically, and between 17% and 70% of children with mathematical difficulties also demonstrated challenges in reading. These co-morbidity rates were the result of interactions between general and disorder specific causation factors.

LeFevre et al. (2010) revealed other connections between literacy and numeracy. The evidence of this research indicated that shared story reading may improve literacy and numeracy skills in young children. The improved numeracy skills may come as a result of conversations stimulated by the story relating to size, shape, and quantity.

Davidse, De Jong, and Bus (2013) investigated the relationship between early literacy skills and early numeracy skills. Their findings suggested that there was a relationship between early literacy skills and basic sums and that rhyming was a predictor of non-symbolic sums. In school settings, it seemed to be important for teachers to understand the delays in literacy are often connected to delays in numeracy and vice versa. Educators should note that when there are delays evident in the development of early numeracy skills, literacy skills should be assessed and vice versa. Interventions to enhance early literacy and numeracy skills may support one another (Davidse, De Jong, & Bus, 2013).

## **Effects of Socio-Economic Status on Student Achievement**

According to Lacour and Tissington (2011) access to quality educational resources outside of school have a positive impact on a student's academic achievement levels at school. Poverty had a negative impact on the availability of academic resources outside of school (Lacour & Tissington, 2011). Socio-economic status may be broadly defined as a child's access to financial, social, cultural, and human resources. A number of factors may contribute to one's socio-economic status including parental education levels, parental occupational status, and household or family income (Cowan, et al. 2012). When poverty in schools has been defined, the primary data source is the percentage of students who are eligible for free and reduced price meals (Parrett & Budge, 2012).

Nationally, approximately 21% of students lived in poverty. Poverty rates range from a national low of 11% in North Dakota to a high of 32% in Mississippi (National Center for Education Statistics, 2014a). The United States had higher percentages of high-poverty students enrolled in schools than the percentages of high-poverty students in comparable countries (Carnoy & Rothstein, 2013).

Poverty in schools may lead to attention problems due to hunger, lack of sleep, and lack of adequate clothing. Families who lived in poverty may also have a tendency to struggle to get students to school regularly. Often times students living in poverty come to school with unmet health needs (White, 2010).

Socio-economic status does matter in education. Results from the Program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMMS) assessments indicated that students from more-advantaged

social classes far outperformed students from less-advantaged social classes (Mullis, Martin, Kennedy, Trong & Sainsbury, 2011). The gap between the groups was large, sometimes as much as a full standard deviation (Carnoy & Rothstein, 2013). Not all students who struggle academically lived in poverty, and not all students who lived in poverty struggle in school (Parrett & Budge, 2012). However, there was a connection between socio-economic status and student achievement (Lacour & Tissington, 2011).

### **School Attendance**

The assumption that students have to be present and engaged in order to learn is often one that is overlooked by school reform efforts (Chang & Romero, 2008). This common-sense thinking was backed up by national and international research (Chang & Romero, 2008; Andrietti & D'Addazio, 2012). The assumption was consistently accurate for learners from kindergarten (Chang & Romero, 2008) through undergraduate work at large universities (Romer, 1993); students need to be present to obtain higher levels of achievement.

National research has shown that too many absences in early grades negatively impacts student learning (Chang & Romero, 2008). The negative impacts occurred regardless of gender, socioeconomic status, or ethnicity. Children who were chronically absent in kindergarten showed lower levels of achievement in reading, math, and general knowledge in first grade. Among students living in poverty, chronic absences in kindergarten predicted the lowest levels of achievement at the end of fifth grade. Chronic absence has been defined as missing 10% or more of school whether excused or unexcused (Chang & Romero, 2008)

Poor attendance was one of the key indicators for a student being at risk for dropping out of high school (Allensworth & Easton, 2007). Chronic absenteeism begins to increase in middle school and continues climbing through grade 12. Balfanz and Chang (2013) identified a strong correlation between grade six attendance and on time graduation rates. In 2008, Maryland had more than 80,000 students with twenty or more absences; both excused and unexcused. Chronic absences affected not only those who missed class, but also those who regularly attended because teachers had to spend so much class time reviewing material for those students who were absent, which resulted in teachers neglecting some of the learning needs of students who were in attendance (Chang, Fathergill, & Mitchell 2009).

Individual teacher attendance policies, as well as school system policies, had an impact on student attendance. Levine (1992) identified three types of attendance policies; required explicit policies, not-required implicit policies, and not-required explicit policies. Required explicit policies required attendance in class and resulted in absences adversely affecting a students' grade in class. Not-required implicit policies have no requirement for attendance and absences did not affect students' grades. Not-required explicit policies were such that attendance was not required or counted in grades, but was encouraged by the classroom teacher. The research reaffirmed that the common-sense idea that the more students were required to attend class the more they actually attended. When attendance was explicitly required, 80% of students missed fewer than four times per term. When attendance was not required and simply implied, 73% of students missed fewer than four times per term. When attendance was explicitly not required, 52% of



students missed more than four times per term. Further, the research demonstrated that the more students were in class the better they performed on exams (Levine, 1992).

Attendance in class made a difference in student learning. Both common sense and research bear this idea out. Chronic absenteeism negatively affected student learning; for both the absent student and those who were in attendance. Improving attendance positively impacted student learning for students at every grade level from kindergarten through undergraduate courses (Chang & Romero, 2008; Romer, 1993).

### **Instructional Time**

The Wyoming State Board of Education, through legislative action, required each school district in the state of Wyoming to hold school classes for 175 days each year. Statute required this amount of time, unless schools have an alternative calendar that was approved by the State Board of Education. School districts that operated schools for fewer than 175 days had to hold public hearings regarding the proposed alternative calendar to garner public feedback on the alternative calendar. School districts had to demonstrate that the alternative calendar has met the academic needs of the students enrolled in the school district. Schools that operated on a four-day school week had to have the alternative calendar approved in the State of Wyoming (Wyoming Statute 21-4-302, 2012).

In Colorado, students in elementary grades must have 990 hours of teacher contact time (Colorado Statute, 22-32-109, 2014). Schools in Montana are required to provide instruction to students in grades one through three for a minimum of 720 hours each year (Montana Code Annotated, 20-1-301, n.d.).

In the fall of 2014, nearly fifty million students attended public secondary and elementary schools in the United States (National Center for Education Statistics, 2014b). Every state in the United States has a mandatory school attendance law (National Center for Education Statistics, 2013). The age range for mandatory attendance varied among states with the most common ages for mandatory attendance being between ages six and 16 (National Center for Educational Statistics, 2008).

The norm for school attendance in the United States is approximately 180 school days each year (Gold, 2002). Most school calendars begin in late August and run through the end of May or beginning of June. The months of June, July, and August constitute the traditional summer break when school attendance has not been required. School usually begins early in the morning and concludes in the afternoon. Generally, schools are in session Monday through Friday with Saturday and Sunday off (Gold, 2002). It is evident that individual states believed that schools within the state should have some uniformity regarding the amount of instructional time that is provided to students (Gold, 2002).

Time in an educational setting is a complex issue. It has been difficult for researchers to isolate instructional time as the variable that has impacted student learning; partly because it has been difficult to determine the amount of time spent on instruction in schools (Pennington, 2006). In addition, instructional time was dependent upon its relationship with curriculum and instructional quality (Baker, Fabrega, Galindo, & Mishook, 2004). Many of the schools that have increased the length of the school day and or the school calendar have done so as part of a larger reform effort (Silva, 2007). New instructional practices, new curricula, and restructuring the school are variables that have played a part in the reform efforts of schools across the country. Because so many

variables were introduced to improve student achievement at once, it has been nearly impossible for researchers to identify which variables have had the greatest impact on student learning (Silva, 2007).

In spite of the challenges associated with isolating time as a prominent variable in student learning, multiple studies have indicated that time really does impact student learning; though not necessarily in isolation (Dobie & Fryer, 2013; Hoxby & Muraka, 2008). Dobbie and Fryer (2013) found instructional time was one of the five factors that had the greatest impact on student learning. Hoxby and Muraka (2008) found that there was a correlation between the length of school day, length of the school year, and the implementation of Saturday tutoring and student achievement in New York charter schools.

Hoxby and Muraka (2008) have encouraged school leaders that were engaged in reform efforts to use time in school, along with other factors, as criteria to improve student learning. The length of school day and the length of the school year are only two of the variables that impacted student achievement. Hoxby and Muraka (2008) noted that neglecting to consider other variables when conducting a study of student achievement could lead to lower than expected student test scores.

Baker et al. (2004) reported that increased instructional time did not have a strong correlational effect on student learning. The connection that did exist between increasing learning time and student achievement in mathematics was weak or non-existent in most nations (Baker et al., 2004). In addition, many countries show no relationship between instructional time and student achievement in science (Baker et al., 2004). There has been evidence that American students are lagging behind their international peers; however,

the amount of instructional time in schools in the United States may not be the primary reason for this international achievement discrepancy (Silva, 2007). Instructional practices, culture and curricula, and the national educational philosophy played significant roles in the achievement of students around the world (Silva, 2007).

Extended learning time alone was not enough to improve student achievement (Goldberg & Cross, 2005). Other factors, such as highly-qualified teachers, quality instructional practices, and a culture of high expectations also contributed to increasing student achievement (Pennington, 2006). If supported by other research-based educational practices, increasing the length of school day and school year may have a positive impact on student achievement (Joyner & Molina, 2012).

### **Brief History of American School Calendar**

Gold (2002) asserted that the development of the modern school calendar was more subtle than the popular misconception that twenty-first century school calendars were based on agrarian needs of the nineteenth century. In reality, standardization of public education was one of the primary factors that led to the modern calendar of five days per week for 180 days each year. In the nineteenth century, there was great discrepancy in the amount of time students were expected to attend school; even within schools in the same state. Some rural schools were in session for only a few months, while students in urban settings were attending school for nearly a full year.

In 1843, rural school systems in the state of New York were in session for as few as five months. By contrast, urban schools in New York held classes for over eleven months. Reformers in the Common School Reform Movement recognized this discrepancy among schools and sought ways to standardize the school calendar. By 1876,

the gap in the length of schooling had narrowed considerably with most New York schools offering classes for somewhere between thirty-nine and forty-two weeks each year (Gold, 2002).

One of the mechanisms used by school reformers in New York in the 1800s was a legislative requirement for the length of the school year. School superintendents desired to have all schools in the state attend school for a similar length of time. By 1890, most school districts in New York offered school calendars consisting of 187 days (Gold, 2002).

Prior to the Civil War, school terms in Michigan were short and inconsistent. In 1842, the average school calendar in the state was four and one-half months. Some rural communities held school for only three and one-half months while other communities did not offer school at all. As in New York, school district superintendents in Michigan pressured state legislators to increase the minimum numbers of days that schools were required to be in session. Prior to 1850, schools in Michigan were only required to operate three months per year. Legislation was passed during the ensuing decades that gradually increased the required time for schools to operate, including a compromise that required large districts to hold school for more days than rural schools. By 1890, the average length of the school calendar was seven and eight-tenths months per year (Gold, 2002).

It should be noted that while rural school calendars were getting longer, urban school calendars were getting shorter. Many schools in urban New York, Michigan, and Virginia reduced the time school was in session from nearly twelve months of operation to around eight months. Some education reformers believed that students and teachers

should have time off to recuperate. Having recesses in the summer also provided opportunities for teachers to grow professionally (Gold, 2002).

Some common school reformers believed that summer sessions held in most urban areas throughout the mid-1800s were less effective than the fall, winter, and spring terms. Therefore, as school calendars between rural and urban areas were gradually aligned, the summer session was the term that was eliminated from the school calendar. Having a term with no school offered provided teachers and students the opportunity to rest their bodies and minds, and for teachers to take advantage of professional growth opportunities (Gold, 2002).

Schools were not in session during the summer months, not because of the United States' agricultural needs, but because of common school reformers and their desire for uniformity of school calendars within individual states. If the school calendar were truly based on agriculture, which many of the rural communities were when they were holding school for four months each year, then school would have been in session during the winter when the ground was frozen and could not be worked and in the summer when the crops were planted and the work on the farm slowed considerably. The busiest times of the year for farmers are the spring when the soil is being worked and crops are being planted and the fall when the harvest is being gathered and stored. It was the Common School Reform Movement of the mid-1800s that led to a school calendar that fits the present model of five days each week for 180 days each year (Gold, 2002).

### **Brief History of Four-Day Week**

Several school districts throughout the United States have adopted the four-day per week school schedule. There are at least twenty-two states; Arizona, California,

Colorado, Georgia, Idaho, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, Nevada, Oklahoma, Oregon, South Dakota, Utah, Wisconsin, and Wyoming, (Nation Council of State Legislators, 2014) and around 290 school districts (Layton, 2011) that allow schools to operate on a four-day per week school schedule. Most of these districts were small, comprised of fewer than 1,000 k-12 students, and tended to be rural or rural and remote in nature. Many of the students in these districts had long bus rides to and from school and had long distances to travel to participate in extra-curricular activities (Chamberlain & Plucker, 2003).

A review of the list of states that allowed schools to operate on the four-day per week school schedule leads one to the conclusion that the majority of the states on the list were west of the Mississippi River. In addition to the states in the U.S. that have adopted the four-day per week school schedule, some foreign countries have used a four-day week as well, including Canada, France, and Great Britain (Donnis-Keller & Silvernail, 2009).

There was evidence of a four-day per week school calendar as far back as the 1930s (Blankenship, 1984). There has been nothing published in the literature to document the progress of the four-day per week school schedule from 1931 to 1973; however, 1973 seems to have been a pivotal year for the adoption of this alternative school calendar (Gaines, 2008).

Conflict in the Middle East led to an oil embargo by the Organization of Arab Petroleum Exporting Countries (OAPEC). This embargo led to an energy crisis in the United States and other countries (Perron, 1988). Fuel prices increased, as did the cost for other energy sources. Many individuals and organizations, including local school districts

were forced to reevaluate their energy consumption. In New Mexico, the Cimarron School District evaluated their energy and fuel consumption and determined that operating four-days per week instead of five days would save them up to 20% on transportation costs and building heating/cooling. Cimarron School District's adoption of the four-day per week school schedule opened the door for other districts to make the same schedule change (Donnis-Keller & Silvernail, 2009).

Since the Cimarron School District adopted the four-day schedule over two hundred ninety other school districts across the country have switched to the four-day per week school schedule (Layton, 2011). This figure represents a 100% increase in the number of school districts operating on four-day per week school schedule in the three years between 2008 and 2011 (Donnis-Keller & Silvernail, 2009).

Financial savings was the most often cited reason that school districts choose to adopt a four-day per week school schedule (Chamberlain & Plucker, 2003). However, there were other reasons that school districts used to decide to adopt a four-day week. Some districts adopted the four-day week because of the number of athletic events held on Fridays and the amount of school time students missed to participate in these extra-curricular activities (Chamberlain & Plucker, 2003). Other school districts want to have more time for professional development for teachers. Having a day with no students in the buildings allowed teachers time to receive training and to catch up on other tasks required of professional educators (Education Northwest, 2013).

There have been several different models that school districts have used when adopting a four-day per week schedule. Some districts utilized the four-day per week schedule only during the winter months. This allowed for additional energy savings



during the most energy intensive time of the year. Other school districts used the four-day per week schedule by only taking off every other Friday. This schedule provided students with nine instructional days that were a little bit longer than a normal instructional day, then students get the tenth day off (Donnis-Keller & Silvernail, 2009).

Another four-day per week model was to have four days of school for a traditional August through May school period. Each week was made up of four long instructional days with the fifth, a non-instructional day, off. Most school districts operating on a four-day per week schedule followed this model of four longer instructional days for nine months between August and May. Friday was the day that most schools on the four-day per week schedule did not hold classes; however, some school districts took Monday off and others used Wednesday for the non-instructional day (Donnis-Keller & Silvernail, 2009).

School districts operating on a four-day school week used the non-instructional day for a variety of purposes. Some school districts used the non-instructional day as a tutoring day for students who were falling behind academically, had low-test scores, or needed additional high school credits to graduate. Other school districts noticed that students were missing school on Fridays for athletic events. Decision makers determined that the best use of student time was to eliminate Fridays from the school academic calendar and use that day as a time for extra-curricular activities. Other school districts on a four-day school week used the non-instructional day as a day for teacher professional development. Teachers took advantage of a day with no students in the buildings to receive training or catch up on lesson planning and/or grading. Some school districts officials elected to use the non-instructional day as a day off for teachers and students so

that there were no academic activities held on the non-instructional day (Chamberlain & Plucker, 2003).

### **Results of the Four-Day Week**

**Student Achievement.** Given the current emphasis on student achievement, one of the first questions to be addressed when school districts contemplate adopting a four-day school week schedule was, “What effect will the schedule likely have on student achievement?” Hewitt and Denny (2011) stated that it does not appear that student academic achievement should be used as a reason not to implement a four-day week. Anderson and Walker (2012) claimed that academic outcomes were not sacrificed when a four-day school week was implemented. Tharp (2004) reported that in the first school year after the adoption of the four-day per week schedule, the percent of students scoring proficient and advanced on MontCAS, the statewide student assessment used in Montana at the time of the study, increased. However, over time the achievement scores of students enrolled in four-day per week schools decreased so that the percent of students scoring proficient and advanced on the MontCAS were lower in four-day per week schools when compared to state averages.

As of 2011, sixty-seven school districts in the state of Colorado had adopted the four-day school week. These districts represent over 37% of all Colorado school districts, but only 3.6% of the total student population. These school districts are spread across the state and range in size from a school district of only 33 k-12 students to a school district of over 8,562 k-12 students. As of 2011, six of the four-day per week school districts in Colorado were accredited with distinction, the highest accreditation rating in the state, forty-one were accredited without merit or concern, thirteen were accredited with

documented improvement plans, and one was accredited with a turn-around plan (Lefly & Penn, 2011).

In a study using student achievement data from school years 2000-2010, Anderson and Walker (2012) analyzed Colorado Student Assessment Program (CSAP) scores to determine the impact of the four-day per week schedule on student achievement. The study compared 4<sup>th</sup> grade reading scores of four-day per week and five-day per week school districts, as well as 5<sup>th</sup> grade math scores for four-day per week and five-day per week school districts. The results indicated the four-day per week schools saw increases in their 4<sup>th</sup> grade reading scores that exceeded the growth of the reading scores from students on a five-day per week schedule. In addition, the four-day per week schools saw an increase in the percentage of students scoring proficient or advanced on the 5<sup>th</sup> grade math assessment.

When groups of students' scores (unsatisfactory, partially proficient, proficient, or advanced) were analyzed, the greatest improvement was realized by students who were formerly classified as partially proficient. This group decreased in size by 4.6% following the adoption of the four-day per week schedule. This improvement was a statistically significant increase in the number of students scoring proficient on the state exam (Anderson & Walker, 2012). In addition, the data analysis indicated that there was a 2.5% drop in the percentage of students scoring in the unsatisfactory category, while the percentage of student scoring in the advanced level increased by 2%. This does not imply that students moved directly from the unsatisfactory to advanced level because of the adoption of a four-day per week schedule; however, these data may indicate that there

was a uniform shift upward in test scores for all achievement levels (Anderson & Walker, 2012).

In the early 1980s, five school districts in Colorado identified as operating on a four-day per week schedule were using the Iowa Test of Basic Skills (ITBS) to determine student achievement (Daly & Richburg, 1984). These districts used the ITBS for at least two years before adopting the four-day per week calendar and for at least two years after the four-day per week schedule adoption. Daly and Richburg (1984) analyzed the ITBS scores for students in grades 3-7 for four consecutive years to determine if the four-day per week schedule had an effect on student achievement.

Daly and Richburg (1984) conducted two different types of analysis. The first compared the same students as they progressed from third grade through fifth grade. The second set of data analyzed included a group of students as they progressed from fourth grade through seventh grade. The second analysis compared students in each grade over the four years; so that third graders were compared with a different group of third graders for each year of the study.

Daly and Richburg (1984) found that when the same students were followed for the four years of the study there was no evidence to suggest that student achievement was affected by a change in the calendar. However, the researchers did note that there was a similar pattern of leveling, and in some cases slight decreases in students' scores during the first year of implementation of the four-day school week. When analyzing the same data for students across the same grade levels for four years there was no evidence, either positive or negative, that the four-day school week affected student achievement.

The state level assessment that Colorado students take is the Colorado State Assessment Program (CSAP). In 2011, the Colorado Department of Education (CDE) compared four-day per week school districts with similar sized districts operating on a traditional five-day calendar to determine the effects of the shorter school week had on student achievement. School and district enrollment was the only factor in pairing four-day per week schools with five-day per week schools (Lefly & Penn, 2011).

In four-day per week elementary schools, 71.4% of students scored at the proficient or advanced levels on CSAP; 71.0% of elementary students on a traditional calendar scored at the proficient or advanced levels; four-tenths of a percent lower than the students on the four-day per week. In the middle grades, 68.4% of students enrolled in four-day school per schools scored proficient or advanced, while 69.1% of students enrolled in schools operating on the traditional five-day per week school calendar scored proficient or advanced. High school student scores were similar to those of middle school students with 68.4% of four-day per week students scoring proficient or advanced, while 67.5% of five-day per week students scored proficient or advanced. Simple percentages were used to compare the four-day per week schools to five-day per week schools. It appears that students in elementary school have a slightly higher percentage of students scoring proficient and advanced when attending four-day per week schools while the percentage of students scoring proficient and advanced in the middle grades and high school was slightly lower for students enrolled in four-day per week schools. No tests of significance were conducted in this study (Lefly & Penn, 2011).

A 2011 Colorado study used a matched district methodology. The researchers matched 62 five-day per week school districts with 62 similar four-day per week school

districts. Matching was done based on k-12 enrollment and the percentage of students who qualified for free and reduced lunch. Student scores on state criterion-referenced assessments for reading, writing, mathematics, and the combined total referred to as total battery, were analyzed for students at the elementary, middle, and high school levels. At each level, the students enrolled in five-day per week school districts scored higher than those students who were enrolled in four-day per week school districts, though only one sub-test area, elementary writing, had a statistically significant difference (Hewitt & Denny, 2011).

A 1993 study conducted in Shelley, Idaho examined the student achievement results, financial changes, and stakeholder perceptions of the school district's decision to adopt a four-day school week (Sagness & Salzman, 1993). The investigators in the study compared Iowa Test of Basic Skills (ITBS) and Test of Academic Proficiency (TAP) scores for one year before and one year after the move from the traditional five-day per week school schedule to the four-day per week schedule was made. A pre-post cohort design was used in order to compare standardized test scores of the same students for two consecutive years; the year prior to the change to a four-day week and the year of the change to a four-day week scores (Sagness & Salzman, 1993).

The results for fourth-grade students ( $n = 189$ ) indicated slightly higher scores on the ITBS following the transition to the four-day week. According to t-test results these increases were statistically significant in five subtest areas (reading, language skills, math, social studies, and science) and for the composite scores (Sagness & Salzman, 1993).

Fifth grade students ( $n = 186$ ) obtained higher scores on two subtests (reading & language skills) but lower scores on all other subtests. The results of a t-test show that the decreases in two subtests (math & social studies) were statistically significant following the implementation of the four-day week.

The sixth grade students ( $n = 184$ ) obtained higher scores on all of the ITBS subtests except for work study skills section of the test following the adoption of the four-day week. An analysis using a t-test indicated that the increases were statistically significant for reading, language skills, math, and science, and the composite scores.

The eighth grade students ( $n = 179$ ) obtained higher scores on the language skills and science subtests and on the composite scores during the year the Shelly School District used the four-day per week schedule. The scores for eighth graders were the same in reading and lower on work study skills, math, and social studies subtests during the year of the four-day school week schedule. The t-test results indicate that only the increase in language skills was statistically significant.

Eleventh grade students ( $n = 145$ ) took the Test of Achievement and Proficiency (TAP). These students scored higher on the reading subtest and were identical on the basic composite scores. The students had lower scores on the language skills, work study skills, math, social studies, and science subtests, and the complete composite scores. Results from the t-test indicated statistically significant decreases in work study skills and social studies test scores following the implementation of the four-day school week.

The basic composite scores for students in grades four and six increased after the adoption of the four-day per week schedule while the basic composite scores for students

in grades five and eight decreased after the adoption of the four-day per week schedule. There was no statistically significant change in the scores for students in grade eleven.

While there were some increases and some decreases in student achievement scores on ITBS and TAP, the changes for all but the sixth grade basic composite scores and the increase in complete composite scores for fourth and sixth grade were the only changes that were shown to have a significant statistical difference (Sagness & Salzman, 1993).

According to Tharp (2014), the first year of operation on a four-day per week might result in a temporary improvement in student scores, however, data suggested that this effect did not hold true over time. Even though the adoption of a four-day per week calendar led to initial increases in the percentage of students scoring proficient and advanced on the MontCAS, over time students in four-day per week schools were achieving proficient and advanced ratings at a lower rate than the rest of the schools in Montana. In addition to achieving proficient and advanced at a lower rate than state averages, the difference between student's scores in four-day per week schools compared to state averages was growing.

A 2007 study from South Dakota used the Stanford Achievement Test 10 (SAT 10) scores to evaluate overall fourth and eighth grade student achievement for school districts operating on a four-day per week schedule. Of the ten districts that reported data, six school districts reported a decrease in fourth grade SAT 10 complete battery scores. The other four school districts reported increases in the SAT 10 complete battery. In six of the ten school districts reporting, eighth grade scores on SAT 10 complete battery decreased (Miller-Hale, 2007).



Custer School District in Custer, South Dakota first adopted a four-day per week schedule for the 1995-96 school year. Feaster (2002) noted that second grade achievement scores had remained higher than state averages since the adoption of the four-day week. However, the fourth grade scores did not remain higher than the state average. In fact, following an increase in fourth grade achievement the year following the adoption of a four-day per week schedule, fourth grade achievement scores have fluctuated above and below the 1994-95 average. In 1994-95, the year prior to the adoption of the four-day per week schedule, eighth grade scores for the Custer School District were well below the state averages. However, since the implementation of the four-day per week schedule, eighth grade averages were higher than the state averages. Eleventh grade scores on standardized tests have consistently been above the state average; however, the scores have not been as high as the average in the 1994-95 school year.

Miller-Hale (2007) examined South Dakota high school ACT scores. Nine school districts on the four-day per week schedule reported scores for their students. Two of the nine schools reported decreases in ACT scores, one school district had ACT scores remain the same, while the remaining six school districts reported that student scores had increased on the ACT.

When reviewing student achievement data, the decision to adopt a four-day per week schedule should not be made solely on the basis of academic performance of students (Hewitt & Denny, 2011). However, the limited evidence available indicated that academic outcomes have not been compromised by the adoption of a four-day per week in the initial year of adopting the schedule. There has been some evidence to suggest that

student achievement scores have increased, especially in elementary math, in the initial year of adoption of the four-day week school schedule (Anderson & Walker, 2012; Tharp, 2014). However, over time, the percentage of students scoring proficient or advanced on statewide assessments have been negatively impacted by the four-day per week calendar (Tharp, 2014).

**Attendance.** Sagness and Salzman (1993) analyzed student attendance in the Shelley, Idaho School District for two years prior to the change to a four-day per week schedule and for the year following the change. The two years before the new schedule was adopted (1990-91 & 1991-92), student attendance data revealed a stable five percent absentee rate. The attendance data for the first year that the four-day calendar was in place (1992-93) revealed student absenteeism had decreased to four percent.

In a case study involving thirteen South Dakota school districts, Miller-Hale (2007) found that the four-day schedule improved student attendance in 62% of the school districts studied. In South Dakota, the average school attendance was 95% statewide. Attendance in schools operating on a four-day per week schedule ranged from 91-95%. Feaster (2002) found that in the Custer, South Dakota School District attendance improved from 95.1% in 1998, to 96.1% for the 2002 school year. These attendance averages exceeded South Dakota state averages for the same time period and were higher than the initial year of implementation (1996) of the four-day week.

**Financial savings.** Sagness and Salzman (1993) reported that the Shelley, Idaho School District realized some financial savings during the first year the school district operated on a four-day per week schedule. The savings came from reductions in electricity, telephone, and transportation costs. However, Miller-Hale (2007) reported

that eleven of twelve school districts in South Dakota that were studied saw increases to their transportation budgets.

**Perceptions.** In multiple studies (Feaster, 2002; Miller-Hale, 2007; Sagness & Salzman, 1993) stakeholder groups were surveyed regarding their satisfaction with the four-day per week schedule. In Shelley, Idaho the majority of students favored the four-day per week schedule over the five-day per week schedule (Sagness & Salzman, 1993).

In separate studies, surveys were administered to parents in Shelley, Idaho (Sagness & Salzman, 1993) and in Custer, South Dakota (Feaster, 2002) to determine their perceptions of the four-day school week. The majority of parents in both school districts indicated that they liked the four-day per week schedule and would like to see the four-day calendar continue in their respective districts.

Teachers, administrators, and support staff indicated their support for the four-day per week schedule (Feaster, 2002; Sagness & Salzman, 1993). Most of the teachers in Shelley, Idaho who participated in the study indicated that they were able to implement a greater variety of teaching and learning activities in their classroom on the four-day per week schedule (Sagness & Salzman, 1993).

## **Conclusion**

Most parents, students, teachers, administrators, and other community members liked the four-day per week school calendar (Feaster, 2002; Sagness & Salzman, 1993). The perception has been that the schedule was beneficial to students and teachers. Studies have shown that the four-day school calendar positively impacted the attendance of both students and teachers (Feaster, 2002; Sagness & Salzman, 1993). Having both students and teachers in the classroom has been shown to positively impact student learning

(Andrietti & D'Addazio, 2012; Brown & Arnell, 2012; Chang & Romero, 2008; Romer, 1993).

The conclusion of whether or not the four-day per week school calendar has a positive or negative impact on student learning is still largely undetermined. Research has suggested that there were some positive student learning outcomes realized by students attending four-day per week schools and some negative student learning outcomes. Still, other research on the topic has been inconclusive. Most of the studies that have been conducted regarding achievement of students enrolled in school districts on the four-day per week school calendar have focused on students in fourth grade or higher. There has been very little empirical research done regarding student achievement on a four-day week in the primary grades. Therefore, the purpose of this study was to determine whether a statistically significant difference existed between student achievement in reading and math of students in first, second, and third grades attending school in four-day per week schools and student achievement in reading and math of students in first, second, and third grades attending school in traditional five-day per week schools in Colorado, Montana, and Wyoming.

## **CHAPTER III**

### **Methodology**

This quantitative study used a matched-pairs design to determine whether a statistically significant difference existed between student achievement in reading and math of students in first, second and third grades attending school in four-day per week schools and student achievement in reading and math of students in first, second and third grades attending school in traditional five-day per week schools in Colorado, Montana, and Wyoming.

This chapter will review the methods used to conduct the study. Included in this chapter are the research questions that guided the study, the process followed for the selection of participants, the instrumentation used to provide data for the study, and the methods used to collect, analyze, and interpret these data.

#### **Research Questions**

1. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school?
2. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between second grade students attending

a four-day per week school and second grade students attending a traditional five-day per week school?

3. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school?
4. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school?
5. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school?
6. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school?
7. Is there a statistically significant difference between school-wide average daily attendance in four-day per week schools and five-day per week schools?

The null hypothesis for each of these research questions include:

1. There is no statistically significant difference in reading achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school.
2. There is no statistically significant difference in reading achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school.
3. There is no statistically significant difference in reading achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school.
4. There is no statistically significant difference in math achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school.
5. There is no statistically significant difference in math achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school.
6. There is no statistically significant difference in math achievement as measured by the MAP/MPG between third grade students attending a

four-day per week school and third grade students attending a traditional five-day per week school.

7. There is no statistically significant difference in average daily attendance between four-day per week schools and five-day per week schools.

### **Participants and Sampling**

All schools in Wyoming were required to assess students in first, second, and third grades using the MAP or MPG to determine academic growth and student achievement. As a result, a set of student performance data on the state-mandated standardized tests were readily available in Wyoming. The researcher decided that these data could be used to determine whether a statistically significant difference in primary grade student reading and math achievement scores existed between students enrolled in four-day per week schools and those students enrolled in five-day per week schools in Wyoming.

The researcher contacted a representative of the Wyoming Department of Education by telephone to obtain a list of schools in Wyoming that operated on a four-day school week. The Wyoming Department of Education representative emailed a list of schools in Wyoming that operated on a four-day per week school calendar to the researcher. Once a list of four-day per week schools was obtained, the researcher contacted a representative of the Wyoming Association of School Administrators by telephone to obtain a list of current school superintendents and their corresponding school district office telephone numbers for each of the four-day per week schools. Each of the four-day per week school superintendents were contacted by the researcher via telephone



to verify that the school district had a school that operated on a four-day school week. It was determined that 16 Wyoming schools operated on a four-day per week school schedule.

The researcher determined that in order for schools to be included in the study, some other common parameters would need to be met. Included in this set of parameters were data related to grade-level student enrollment. The researcher determined that in order to be included in this study each grade-level had to have at least five students enrolled in each grade. This decision was made to ensure that no individual student scores would be identifiable in the class data for a particular school because of very low class enrollment. These data were collected from the Wyoming Department of Education website for all of the four-day per week schools in Wyoming.

An analysis of the enrollment data revealed that seven of the 16 four-day per week schools had fewer than five students in at least one of the grade-levels being studied. Consequently, these schools were dropped from the study due to low grade-level enrollment. This action reduced the number of Wyoming schools operating on a four-day per week schedule that were included in this study from 16 to nine.

It was determined that a study involving only nine schools in Wyoming would be too few to conduct a meaningful study. As a result, the researcher decided to add four-day per week schools from other states to the study. A review of related literature about four-day per week schools revealed that other states in the intermountain west region; Colorado (Daly & Richburg, 1984; Dam, 2006; Hewitt & Denny, 2011; Lefly & Penn, 2011), Idaho (Sagness & Salzman, 1993), Montana (Juneau, 2011; Tharp, 2014), and

South Dakota (Feaster, 2002; Miller-Hale, 2007) all had schools that operated on a four-day per week school schedule.

A representative from NWEA was contacted by telephone to determine if any of these states had schools that used the MAP/MPG to measure student achievement. The representative from NWEA would not share specific school names that used MAP/MPG to assess student achievement, however, data shared by the NWEA representative indicated that both Colorado and Montana had several schools using the MAP/MPG. Idaho and South Dakota each had a few schools that used MAP/MPG, but the number of schools using MAP/MPG in Idaho and South Dakota were significantly less than in Colorado and Montana, so the researcher decided to include Colorado and Montana schools in the study. The researcher elected not to include South Dakota and Idaho schools in the study due to the relatively low number of schools in these states that used MAP/MPG to assess primary grade student academic growth and achievement.

The researcher contacted a representative from the Colorado Department of Education (CDE) by telephone to obtain a list of schools that operated on a four-day per week schedule. The CDE representative emailed the researcher a list of schools in Colorado that had school closures at least one day per week Monday through Friday. There were 96 Colorado schools listed as operating on an alternative calendar.

A representative of the Montana Office of Public Instruction was contacted by telephone to obtain a list of four-day per week schools in Montana. The representative advised that a list of Montana schools operating on a four-day per week school schedule could be found by conducting an Internet search using the search terms “Montana four-

day school weeks” (Juneau, 2011). This list contained 32 elementary schools that operated on a four-day per week school schedule.

Once the lists of four-day per week schools in Colorado and Montana were obtained, the researcher called a representative of each of the schools listed on the telephone to verify the school operated on a four-day per week schedule. School telephone numbers were found by conducting an Internet search using the school name as a search term for each of the listed four-day per week schools. Of the 96 Colorado schools listed as having no school one day each week Monday through Friday, only 29 were verified by direct phone contact as actually operating on a four-day per week schedule. All 32 Montana schools listed as operating on a four-day per week schedule were verified by telephone contact as actually operating on a four-day per week school schedule.

Grade-level enrollment data for each of the 61 four-day per week schools identified in Colorado (29) and Montana (32) were analyzed. Grade-level enrollment data for all four-day per week schools and five-day per week schools in Colorado were collected from the Colorado Department of Education website. A careful analysis of the grade-level enrollment of each of the Colorado schools operating on a four-day per week schedule revealed that two of the schools had fewer than five students in at least one of the grade levels included in this study. These schools were dropped from the study due to low grade-level enrollment. This brought the number of Colorado schools with sufficient grade-level enrollment operating on a four-day week to 27 schools.

Enrollment data for all four-day per week schools and five-day per week schools in Montana was collected from the Montana Office of Public Instruction website. There

were 19 Montana schools that were verified as operating on a four-day per week schedule that had fewer than five students in at least one grade included in this study. These schools were, consequently, dropped from the study. This reduced the number of four-day per week Montana schools from 32 to 12 schools.

There was also one private parochial school and one public charter school that operated on a four-day per week schedule in Montana. These schools were not included in the study. The researcher determined that private parochial and public charter schools would not be included in the study because of the complications associated with matching them with appropriately similar five-day per week schools. The researcher determined to include only regular public schools as participants in this study. This brought the number of Montana schools with sufficient grade-level enrollment operating on a four-day per week schedule to 11 schools. The total number of Colorado, Montana, and Wyoming schools operating on a four-day per week schedule with at least five students in each of the first, second, and third grades was 47 regular public schools.

Another common parameter for the study was the reported free and reduced lunch data for each school. Free and reduced lunch data for all four-day per week schools was collected from the Colorado Department of Education website, the Montana Office of Public Instruction website, and the Wyoming Department of Education website.

School-wide free and reduced lunch participation was used as an indicator of the poverty level of each school. School-wide free and reduced lunch data were used as a matching criterion because, according to Lacour and Tissington (2011), poverty can have a negative impact on the availability of academic resources to families outside of school, which can negatively impact students' ability to learn in school.

While analyzing school-wide free and reduced lunch data for each of the participating schools it was discovered that one of the four-day per week Wyoming schools that met the student enrollment threshold of five students in each grade-level being studied did not report free and reduced lunch data to the Wyoming Department of Education in the 2014-2015 school year. This school was dropped from the study. All of the schools from Colorado and Montana meeting the four-day schedule and grade-level enrollment criteria reported free and reduced lunch data in 2014-15 and were included in the study. There were 46 four-day per week schools in Colorado, Montana, and Wyoming that met the initial inclusion criteria to participate in this study.

Once each of the four-day per week schools were identified as having met the initial criteria of using a four-day per week calendar, having at least five students enrolled in each grade from first through third grades, and having reported free and reduced lunch data the researcher again contacted a representative from each school by telephone to determine if the school used the MAP/MPG to measure student achievement in first through third grades. Of the 27 Colorado schools meeting the four-day schedule and enrollment criteria only 16 schools used the MAP/MPG. Of the 11 Montana schools meeting the four-day schedule, student enrollment, and free and reduced lunch criteria, only seven schools used the MAP/MPG. All eight of the Wyoming schools that operated on the four-day per week schedule, had a minimum of five students in each grade-level, and reported school-wide free and reduced lunch data were included in the study. This brought the number of four-day per week schools meeting all of the inclusion criteria to 31 schools.

A number of criteria were used to match four-day per week schools with five-day per week schools for this study. Each of the four-day per week schools were matched with five-day per week schools in the same state to control for differences in state rules and regulations regarding instructional hour requirements among the three states included in the study. Each four-day per week school identified for inclusion in this study was matched with one five-day per week school in the same state. All Colorado four-day per week schools were matched with a five-day per week school from Colorado. All four-day per week schools in Montana were matched with five-day per week schools in Montana. Wyoming four-day per week schools were matched with a five-day per week school from Wyoming.

Once it was determined that four-day per week schools would be matched with five-day per week schools from the same state, it became necessary to identify five-day per week schools for inclusion in the study. Five-day per week schools were identified for inclusion in the study based on the inclusion criteria established for this study: grade-level enrollment, free and reduced lunch data, and the use of MAP or MPG test in first, second, and third grades. In order to be matched with a four-day per week school five-day per week schools had to have grade-level enrollments within 10 students in each grade-level of the four-day per week school with which they were matched. Because it had been determined that the number of students in a class had an impact on student learning (Mosteller, 1995), the researcher decided that grade-level enrollments needed to be within 10 students of the four-day per week schools to be considered a match. In order to be considered a match five-day per week schools and four-day per week schools had to have within 25% free and reduced lunch participation of one another.

Grade-level enrollment data for all five-day per week schools in Colorado was obtained from the Colorado Department of Education website. The researcher examined the data and highlighted all of the four-day per week schools included in the study in red. The researcher reviewed the grade-level enrollment data to identify schools that had enrollments of within 10 students in each grade of the included four-day per week schools. These school names were highlighted in blue to distinguish them as possible schools to include in the study. A new spreadsheet was created with the names of the five-day per week schools that met the grade-level enrollment inclusion criteria. This list contained 19 schools that could be matched with the Colorado four-day per week schools.

A representative from each school was contacted by telephone to verify that the school operated on a five-day per week schedule and to determine if the school used the MAP/MPG to measure student achievement in first, second, and third grades. All school phone numbers were found by conducting Internet searches using the school names as search terms. Of the 19 schools identified as possible matches all of the schools operated on a five-day per week school schedule and 16 used the MAP/MPG to measure student achievement in the grade-levels being studied.

Free and reduced lunch data for all five-day per week schools in Colorado was obtained from the Colorado Department of Education website. The researcher identified the free and reduced lunch data for the 16 five-day per week schools that met the grade-level requirements and used MAP/MPG. All of the schools reported free and reduced lunch to the Colorado Department of Education for the 2014-15 school year.

Using the grade-level enrollment data and the free and reduced lunch data the five-day per week schools that used MAP/MPG to measure student achievement were

matched with a four-day per week school that had grade-level student enrollments within 10 students per grade-level in each grade and a free and reduced lunch count within 25 percentage points of the four-day per week schools. There were 16 matched-pairs from Colorado identified for inclusion in the study.

Enrollment data for all Montana five-day per week schools was gathered from the Montana Office of Public Instruction website. The grade-level enrollment spreadsheet from the Montana Office of Public Instruction was more difficult to navigate than the spreadsheet from the Colorado Department of Education. The researcher identified Montana five-day per week schools that had grade-level enrollments within 10 students in each grade-level of the four-day per week schools identified for inclusion in the study. Due to the difficulty of navigating the Montana grade-level enrollment spreadsheet the researcher did not highlight four-day per week schools and five-day per week schools from Montana as was done for Colorado. The researcher was able to identify at least one five-day per week school that had a grade-level student enrollment within 10 students per grade-level of the four-day per week schools. Two of the four-day per week schools had two possible matches.

Free and reduced lunch data for all five-day per week schools was obtained from the Montana Office of Public Instruction website. The researcher identified the free and reduced lunch data for all of the five-day per week schools identified for possible inclusion in the study. All of the possible five-day per week schools identified for inclusion in the study reported free and reduced lunch data to the Montana Office of Public Instruction for the 2014-15 school year.



A representative for each of the five-day per week schools identified for possible inclusion in the study were contacted by telephone to determine whether the MAP/MPG was used in the school to measure student achievement in first, second, and third grades in spring 2015. All school telephone numbers were found by conducting an Internet search using the school names as search terms. One of the Montana five-day per week schools identified for possible inclusion in the study did not administer the MAP/MPG in the spring of 2015 to students at the school. This school was not included in the study. The researcher was unable to identify another five-day per week school that had a grade-level enrollment within 10 students in each of the grade-levels being studied of the potential four-day per week school match. The four-day per week school was also dropped from the study due to the lack of a matching five-day per week school.

Using grade-level enrollment data and free and reduced lunch data the five-day per week schools that used MAP/MPG to measure student achievement were matched with a four-day per week school that had grade-level enrollments within 10 students per grade-level in each grade and within 25 percent of free and reduced lunch data. There were five matched-pairs in Montana identified for inclusion in the study.

The grade-level enrollment data for all Wyoming schools was obtained from the Wyoming Department of Education website. The researcher created a spreadsheet of four-day per week schools in Wyoming that met the inclusion criteria for the study. The spreadsheet included grade-level enrollment and free and reduced lunch data for each of the four-day per week schools. The grade-level enrollment data for the five-day per week schools was reviewed to identify five-day per week schools that had grade-level enrollments within 10 students in each grade-level of the included four-day per week

schools. These five-day per week schools were identified for potential inclusion in the study. The researcher added these schools to the Wyoming four-day per week school spreadsheet with the grade-level enrollment data of each grade included.

Free and reduced lunch data for all Wyoming schools was obtained from the Wyoming Department of Education website. This data was reviewed for those schools identified for possible inclusion in the study. All of the five-day per week schools that met the grade-level enrollment criteria reported free and reduced lunch data for the 2014-15 school year. The free and reduced lunch data for the five-day per week schools was added to the Wyoming four-day per week school spreadsheet.

The grade-level enrollment and free and reduced lunch data was examined to determine whether the potential five-day per week schools had a grade-level enrollment within 10 students per grade-level and within 25 percent of free and reduced lunch data of the four-day per week schools. The researcher was able to match all eight Wyoming four-day per week schools with a Wyoming five-day per week school that had grade-level enrollments within 10 students per grade-level and 25 percent free and reduced lunch data.

Not all of the five-day per week schools that were initially identified as matches for the four-day per week schools administered the MAP/MPG. Consequently, if a school did not use MAP/MPG to assess student reading and math achievement in first, second, and third grades, they were not included in the study and another five-day per week school that met the matching criteria was identified to participate in the study.

Once all included four-day per week schools were matched with a five-day per week school that met all of the inclusion criteria, the superintendent of each four-day per

week school identified to participate in the study was contacted to obtain permission to participate in the study, to determine usage of MAP/MPG, to obtain consent to collect grade-level mean RIT scores for reading and math in first, second, and third grades from the spring 2015 administration of MAP/MPG, and to obtain consent to gather school-wide average daily attendance data.

### **Instrumentation**

The Measures of Academic Progress (MAP) is a computer adaptive interim assessment that was administered to students in second through twelfth grade. The MAP assessment can be used to measure student achievement and growth in reading, language usage, and mathematics. Northwest Evaluation Association (NWEA), the creators of the MAP and the MPG, recommend using the assessment three to four times per year to monitor growth in the academic areas (MAP Technical Manual, 2011).

The MAP for Primary Grades tests (MPG) is a computer adaptive interim assessment that is administered to students in kindergarten through second grade. The MAP and MPG were both developed by Northwest Evaluation Association. For this study, the grade level results from the MAP and the MPG from the spring 2015 administration were used (MAP Technical Manual, 2011).

Student scores on MAP and MPG are expressed using Rausch Unit (RIT) scores. The RIT scale is a stable, equal interval vertical scale used to compare the performance of one student, or a group of students to national achievement and growth norms and state standards (Northwest Evaluation Association Teacher, 2004). Student RIT scores can be reported individually or by grade level on MAP/MPG. For this study only aggregated grade level scores were reported and analyzed (MAP Technical Manual, 2011).

**Reliability.** Reliability coefficients have been established by Northwest Evaluation Association for both the MAP and the MPG. The reported reliability coefficients for both assessments are consistently in the low to mid .80s. The high levels of reliability are credited to the adaptive nature of the assessments and the large number of test items included per content area per assessment (MAP Technical Manual, 2011).

**Validity.** NWEA determined three different types of validity to ensure that the MAP and the MPG measured student growth in reading and mathematics; concurrent validity, predictive validity, and criterion-related validity. Concurrent validity was established by comparing MAP/MPG scale scores with the scale scores from a similar test in similar subjects. The MAP and the matching tests were administered to the same subjects in close temporal proximity. The concurrent validity tests were completed in the spring of 2009 in Colorado and in the spring of 2006 in Wyoming. There were no validity scores reported for Montana MAP or MPG (MAP Technical Manual, 2011).

***Concurrent validity.*** To establish concurrent validity for the MAP and the MPG in Colorado, the MAP/MPG was compared to the Reading Goals Survey for the reading test. The results of this comparison generated concurrent validity correlations between the two tests of .763 for second graders ( $n = 6,313$ ), .80 for third graders ( $n = 6,443$ ). There was no concurrent validity correlation established for first grade reading tests in Colorado, since there was no other data to use for analysis (MAP Technical Manual, 2011).

In Wyoming, the MAP/MPG was compared to the Reading Goals Survey for the reading test. The comparison of scores on these two assessments resulted in concurrent validity correlations between the two tests of .70 for second graders ( $n = 824$ ) and .82 for

third graders ( $n = 832$ ). There were no concurrent validity correlation established for first grade reading tests in Wyoming, since there was no other data to use for analysis (MAP Technical Manual, 2011).

To establish concurrent validity for the math section of the MAP and the MPG assessments in Colorado, the MAP and the MPG were compared to the Math Goals Survey in the spring of 2009. The concurrent validity correlations between the two tests were reported as .80 for second graders ( $n = 6,248$ ) and .85 for third graders ( $n = 6,311$ ). There was no concurrent validity correlation established for first grade math tests in Colorado, since there was no other data to use for analysis (MAP Technical Manual, 2011).

In Wyoming, the MAP/MPG was compared to the Math Goals Survey in the spring of 2006. The comparison on these two assessments resulted in reported concurrent validity correlations between the two tests of .68 for second graders ( $n = 824$ ) and .64 for third graders (MAP Technical Manual, 2011). There was no concurrent validity established for first grade math tests in Wyoming, since there was no other data to use for analysis (MAP Technical Manual, 2011).

***Predictive validity.*** Predictive validity was also determined for MAP and the MPG. This type of validity measure is similar to concurrent validity in that two tests that are supposed to measure the same thing are compared, but instead of comparing student scores within close temporal proximity the second test is administered 12 to 26 weeks after the first assessment is administered (MAP Technical Manual, 2011).

To establish predictive validity for the reading section of the MAP and MPG in Colorado, the MAP/MPG was compared to the Reading Goals Survey in the spring of

2009. The predictive validity correlations between the two tests were reported as .76 for second graders ( $n = 5,229$ ) and .79 for third graders ( $n = 5,515$ ). There was no predictive validity correlation established for first grade reading tests in Colorado, since there was no other data to use for analysis. There were no predictive validity scores reported for Montana or Wyoming MAP or MPG tests (MAP Technical Manual, 2011).

To establish predictive validity for the math section of the MAP and MPG in Colorado, the MAP/MPG was compared to the Math Goals Survey in the spring of 2009. The predictive validity correlations between the two tests were reported as .77 for second graders ( $n = 5,427$ ) and .82 for third graders ( $n = 5,526$ ). There was no predictive validity correlation established for first grade math tests in Colorado, since there was no other data to use for analysis. There were no predictive validity scores reported for Montana or Wyoming (MAP Technical Manual, 2011).

***Criterion-related validity.*** Criterion-related validity was the third measure that was used to determine the validity of MAP/MPG. Criterion-related validity examined the extent to which test scores on an assessment related to some external performance criterion. For the MAP/MPG, a student score of proficient or above on a state assessment was used as an external criterion (MAP Technical Manual, 2011).

To establish criterion-related validity for the reading section of the MAP and the MPG in Colorado, the criterion used was a score of proficient on the Reading Goals Survey on a spring 2009 administration of the test. The criterion-related validity correlation between MAP/MPG and the Reading Goals Survey were reported as .55 for second graders ( $n = 5,253$ ) and .64 for third graders ( $n = 5,533$ ) (MAP Technical Manual, 2011). There was no criterion-related validity correlation established for first grade

reading tests in Colorado, since there was no other data to use for analysis (MAP Technical Manual, 2011).

In Wyoming, the criterion used was a score of proficient on the Reading Goals Survey administered in the spring of 2006. The criterion-related validity correlation between MAP/MPG and the Reading Goals survey were reported as .59 for second grade ( $n = 824$ ) and .55 for third grade ( $n = 832$ ) (MAP Technical Manual, 2011). There was no criterion-related validity correlations established for first grade reading tests in Wyoming, since there was no other data to use for analysis. There were no criterion-related validity scores reported for Montana for MAP or MPG tests (MAP Technical Manual, 2011).

### **Data Collection**

Grade-level enrollment data and free and reduced lunch data were collected from the Colorado Department of Education website, the Montana Office of Public Instruction website, and the Wyoming Department of Education website. Throughout the data collection process all data were entered into an electronic spreadsheet and stored on the researcher's password protected computer in the researcher's locked office.

The researcher identified excessive student absenteeism as a possible contributing factor to student academic growth and achievement, particularly in the early grades (Chang & Romero, 2008). It was determined that average daily attendance data for the school would be collected and analyzed to try to eliminate attendance as a factor in any differences in student achievement. Average daily school-wide attendance data were collected by contacting a representative from each school identified for inclusion in the study. The data was analyzed using paired samples t-tests to compare mean average daily attendance for the schools that met all of the inclusion criteria to participate in this study.

Grade-level average daily attendance was not collected or analyzed because schools do not generally report grade-level average daily attendance. The researcher assumed that school-wide average daily attendance data would be a reflection of the grade-level average daily attendance within a school. Average daily attendance data was not collected on a statewide basis for any of the schools participating in this study. Each participating school collected, recorded, and stored this information locally.

Grade-level mean RIT scores for reading and math on MAP/MPG for individual schools were not publicly available. Student scores for each grade-level and each subject from the MAP and the MPG were shared with schools participating in the assessments via the NWEA website. None of the participating state departments of education or offices of public instruction collected MAP or MPG data for reporting. Aggregate grade-level mean Rausch Unit (RIT) scores were collected by individual school personnel and were not publicly available. Mean RIT scores for this study were collected from a school representative for each school participating in this study.

School-wide average daily attendance data was not publicly available for any schools included in the study. Each school collected and stored the average daily attendance locally.

A representative of each school had to be contacted personally by the researcher to obtain the test score data necessary to complete the study. Initially, school superintendents were the point of contact for data collection. However, school secretaries, district clerks, or school principals often provided the needed information. Average daily attendance and mean RIT scores were collected by calling and/or emailing school representatives throughout the months of October, November, and December 2015.



Phone numbers and email addresses were collected by conducting Internet searches using the school names for search terms.

### **Design and Analysis**

The matched-pairs design was chosen because schools and classes in each state could not be randomly assigned to either four-day or five-day school week schedules. Schools were paired by matching them based on school schedule (four-day week or five-day week), the state in which each school was located, the use of MAP or MPG, the grade-level enrollment, and free and reduced lunch data for the school. None of the matching variables could be randomly assigned for any of the pairs of schools in this study.

Using the matched-pairs design allowed the researcher to control for differences in state policies and practices, grade-level enrollment, and free and reduced lunch data. Each of these variables had the potential to impact student achievement, therefore, matching schools with similar grade-level enrollments and free and reduced lunch data allowed the researcher to control the impact of these variables on the study parameters.

Because the researcher was unable to randomly assign schools or classes, each school implementing a four-day per week schedule was matched with a five-day per week school based on similar characteristics of grade-level enrollment and school-wide free and reduced lunch data from the same state. The study compared the first, second, and third grade-level mean RIT scores from the spring 2015 administration of the MAP or MPG assessment in reading and math for Colorado, Montana, and Wyoming schools on the four-day per week schedule with the first second, and third grade-level mean RIT scores for Colorado, Montana, and Wyoming schools on the five-day per week schedule.

NWEA MAP/MPG aggregated grade-level RIT scores so the data reflected the mean RIT score for all students in a school by grade-level for the reading test and the math test.

Paired-samples t-test analyses were used to compare the mean RIT scores of students in four-day per week schools with the mean RIT scores of students in five-day per week schools in reading and mathematics. Separate paired-samples t-tests were conducted by grade level (first grade, second grade, and third grade). A total of six paired-samples t-tests were conducted to address each of the first six research questions that guided this study. The significance level was set at .05 for each of the tests. Although this strategy risked an increased family-wise error rate for Type-I decision error for the set of six t-tests, this strategy was planned due to the risk of making a Type-II decision error given the limited sample size and lower power of this investigation. The limited sample size was due to the limited number of schools that met all of the matching criteria and reported data.

A paired samples t-test was used to compare the average daily attendance of the four-day per week schools with the average daily attendance of the five-day per week schools. One paired-samples t-test was conducted for average daily attendance. The significance level was set at .05 for this test.

### **Method Summary**

This study was designed to compare student achievement and average daily attendance of students enrolled in primary grades (1-3) in four-day per week schools with the student achievement and average daily attendance of students enrolled in primary grades (1-3) in five-day per week schools. The matched- pair design was used to control for variables such as class size and socio-economic status. The initial intent of the study

was to compare student achievement in Wyoming. However, due to low student enrollment in seven of the Wyoming four-day per week schools, other states had to be added to the study. Eventually, Colorado and Montana were added to the study.

## **CHAPTER IV**

### **Results**

This quantitative study used a matched-pairs design to determine whether a statistically significant difference existed in reading and mathematics achievement of first through third grade students enrolled in four-day per week schools and the reading and mathematics achievement of first through third grade students enrolled in five-day per week schools in Colorado, Montana, and Wyoming. An extensive review of the related literature revealed a significant lack of empirical research done on the impact of the four-day school week on student achievement in primary grades. Lefly and Penn (2011) and Daly and Richburg (1984) analyzed achievement scores of students enrolled in four-day per week schools, but the lowest grade-level studied was third grade. Anderson and Walker (2012) and others (Feaster, 2002; Hewitt & Denny, 2011; Miller-Hale, 2010; Sagness & Salzman, 1993) conducted studies that utilized student achievement data in upper elementary and secondary grades. Consequently, this study focused on achievement of students in the primary grades; first, second, and third.

Schools were selected to participate in this study by the researcher identifying those schools in Colorado, Montana, and Wyoming that operated on a four-day per week schedule. It was determined that in order to qualify for participation in the study all schools had to have at least five students in each grade-level being studied, report free and reduced-price lunch data, and assess student achievement using the MAP/MPG.

## **Participation Data**

This study employed a matched-pairs design. Using the matched-pairs design allowed the researcher to control for differences in state policies and practices, grade-level enrollment, and free and reduced lunch data. Matching each of the four-day per week schools with one five-day per week school with similar grade-level enrollments and free and reduced lunch data allowed the researcher to control the impact of these variables on the study parameters. Because the researcher was unable to randomly assign schools or classes, each school implementing a four-day per week schedule was matched with a five-day per week school based on similar characteristics of grade-level enrollment and school-wide free and reduced lunch data from the same state.

Once all data were collected for the four-day per week schools and matched five-day per week schools that met all of the matching criteria and reported data there were 32 schools included in the study. One four-day per week school in Colorado that met all of the matching criteria and reported all data did not administer the MAP/MPG to students in third grade during the spring of 2015. The total number of participating four-day per week schools for third grade was 15 as compared to 16 participating four-day per week schools for first and second grades (see Table 1).

Table 1

*Four-Day Data Collection for Inclusion in the Study*

	Four-Day Week	Four-Day Week Grade-Level Enrollment >5 Regular Public School	Four-Day Week Grade-Level Enrollment >5 Free/Reduced Lunch Data	Four-Day Week Grade-Level Enrollment >5 Free/Reduced Lunch Data Use MAP/MPG
Colorado	29	27	27	16
Montana	32	11	11	7
Wyoming	16	9	8	8
Initial Inclusion Total				31

Inclusion criteria for this study were established prior to any data collection activities. As data were collected the number of schools that met all of the inclusion criteria decreased. In addition to meeting all of the matching criteria, schools had to report complete data in order to be included in the study. There were six Colorado four-day per week schools and six Colorado five-day per week schools that met all inclusion and matching criteria, reported complete data, and agreed to participate in the study. During the data collection process it was discovered that five of the Colorado four-day per week schools did not administer the MAP/MPG to first, second, and third graders during the spring of 2015. One of the Colorado five-day schools did not send data for the study. The researcher was unable to identify another five-day per week school in

Colorado that met all of the matching criteria. The matching four-day per week school was dropped from the study. One four-day per week school district superintendent was not comfortable sharing data for the study and was not included. Three of the Colorado four-day per week schools that met all of the inclusion criteria did not send data for the study (see Table 2).

All eight of the Wyoming schools that met the initial inclusion criteria of four-day per week schedule, grade-level enrollment greater than five students in each grade, reported free and reduced lunch data, and use of MAP/MPG were included in the study.

Table 2

*Colorado and Montana Four-Day Per Week School Participation*

	No MAP	No Permission	No Match	No Data	Total
Colorado Four-Day Schools	5	1	1	3	6
Montana Four-day Schools	2		3		2

Two of the Montana four-day per week schools that initially reported using MAP/MPG to assess student achievement in first, second, and third grades did not administer the MAP/MPG in the spring of 2015. These schools were not included in the study. There were three Montana four-day per week schools that met all of the inclusion criteria for the study but an appropriate five-day per week school could not be identified as a match. These schools were not included in the study. There were two Montana four-day per week schools and two Montana five-day per week schools that met all inclusion criteria, reported complete data, and agreed to participate in the study (see Table 2).

**Data Analysis**

One paired-samples t-test for each grade was conducted to determine if a statistically significant difference in mean grade-level enrollment for first, second, and third grades existed between the four-day per week schools included in this study and the five-day per week schools included in this study. Only one paired-samples t-test per grade-level was necessary because the mean grade-level enrollment for all participating schools in each grade-level was used to compare grade-level enrollment of four-day per week schools to grade-level enrollment of five-day per week schools. An analysis of the data revealed that there was no statistically significant difference between grade-level enrollments for any of the grades included in the study (see Table 3).



Table 3

*Enrollment by Grade-Level*

	<i>n</i>	<i>M (SD)</i>	<i>p (.05)</i>
Four-Day Grade 1 Enrollment	16	27.00 (17.85)	
Five-Day Grade 1 Enrollment	16	28.25 (16.96)	
sig			.397
Four-day Grade 2 Enrollment	16	26.75 (17.14)	
Five-Day Grade 2 Enrollment	16	27.81 (15.39)	
sig			.431
Four-Day Grade 3 Enrollment	15	27.56 (16.39)	
Five-Day Grade 3 Enrollment	15	28.00 (15.10)	
sig			.729

One paired-samples t-test was also conducted to determine if a statistically significant difference existed between the mean school-wide free and reduced lunch data for four-day per week schools and five-day per week schools included in this study. Only one paired-samples t-test was necessary because the mean school-wide free and reduced lunch data for all participating schools operating on a four-day per week calendar was compared to the mean school-wide free and reduced lunch data for all participating schools operating on a five-day per week schedule. An analysis of the data revealed that

no statistically significance difference existed between the means for the school-wide free and reduced lunch data variable (see Table 4).

Table 4

*School Wide Free and Reduced Lunch Data*

	<i>n</i>	<i>M (SD)</i>	<i>p (.05)</i>
Four-Day Free/Reduced	16	44.43 (4.06)	
Five-Day Free/Reduced	16	48.82 (15.10)	
sig			.362

Paired samples t-tests were conducted to address the seven research questions that guided this study:

1. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school?
2. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between second grade students attending four-day per week school and second grade students attending a traditional five-day per week school?
3. Is there a statistically significant difference in reading achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school?

4. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school?
5. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade student attending a traditional five-day per week school?
6. Is there a statistically significant difference in math achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school?
7. Is there a statistically significant difference between school-wide average daily attendance in four-day per week schools and five-day per week schools?

This study compared the first, second, and third grade-level mean RIT scores for reading and math achievement from the spring 2015 administration of MAP/MPG for Colorado, Montana, and Wyoming schools on the four-day per week school schedule with that of the first, second, and third grade-level mean RIT scores for reading and math achievement from the spring 2015 administration of MAP/MPG for Colorado, Montana, and Wyoming schools on the five-day per week school schedule. The Measure of Academic Progress (MAP) and Measure of Academic Progress in Primary Grades (MPG) provided RIT scores to determine student's academic growth and achievement. The MAP and MPG reported scores in Rausch Units (RIT); a stable, equal-interval curriculum scale that uses test-item difficulty values to estimate student achievement. (Northwest Evaluation Association Teacher, 2004).

The NWEA aggregated MAP/MPG grade-level RIT scores so the data reflected the average RIT score of all students in a school by grade-level for the reading test and the math test. No individual student data were collected or analyzed at any point during this study.

Using SPSS software, the researcher employed a paired-samples t-test to analyze the mean RIT scores of students in four-day per week schools with the mean RIT scores of students in five-day per schools in reading and mathematics. All four-day per week schools mean RIT scores were aggregated and all five-day per week schools RIT scores were aggregated to compare the means for reading and math in first, second, and third grades. A paired-samples t-test was conducted to compare the mean RIT scores for each grade-level (first, second, and third) in each content area (reading and math) for all four-day per week schools to mean RIT scores for each grade-level (first, second, and third) in each content area (reading and math) for all five-day per week schools.

A total of six paired-samples t-tests were conducted to address the first six research questions. The significance level for each of the six paired-samples t-tests was set at .05. Although this strategy risked an increased family-wise error rate for Type-I decision error for the six t-tests, this strategy was implemented due to the risk of making a Type-II decision error, given the limited sample size and lower power of this investigation. The limited number of schools that met all of the matching criteria and reported data for this study significantly limited the sample size of the study.

School-wide average daily attendance data were collected from a representative of each participating school and analyzed using a paired-samples t-test. The significance level for this test was set at .05.

## Reading and Math Results

The results of the paired-samples t-tests for each grade-level and content area is discussed in this section. In addition, the results of the paired-samples t-test used to compare school-wide average daily attendance between four-day per week schools and five-day per week schools is shared. This section provided the results generated from this study to address the seven research questions that guided this study.

**First Grade Reading.** To address the first research question that guided this study, the researcher used a paired-samples t-test to determine whether a statistically significant difference existed between the mean RIT scores for first grade reading from the spring 2015 administration of the MAP/MPG between first grade students enrolled in four-day per week schools and first grade students enrolled in five-day per week schools.

Table 5 presents the means and standard deviations of the student RIT scores by school schedule and the 95% confidence intervals for the means. An analysis of the data revealed that no statistically significant difference existed between the average RIT scores of four-day per week and five-day per week first graders in reading,  $t(15) = -1.40$ ,  $SE = 2.17$ ,  $p = .18$ ,  $d = 0.34$ .

Table 5

*Mean RIT Reading Scores Grade 1*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	16	179.82 (9.56)	174.72	184.92
Five-Day	16	182.87 (8.07)	178.57	187.17

As a result of this t-test, a p-value ( $p = .18$ ) was generated that was greater than the significance threshold of .05, established before calculating the p-value, the researcher failed to reject the null hypothesis that there was no statistically significant difference in reading achievement as measured by the MAP/MPG between first grade students attending a four-day per week school and first grade students attending a traditional five-day per week school. The lower mean of the reading scores for the four-day per week schedule was not sufficiently different from the mean of the five-day per week schedule to be beyond what might occur by chance alone. The effect size was small ( $d = 0.34$ ), but would be considered to be meaningful if the t-test had yielded a statistically significant difference in mean RIT scores. Therefore, in spite of not having statistical significance there may be some effect of the four-day per week schedule on reading achievement in first grade. This should be examined in a study generating greater statistical power.

**Second Grade Reading.** In an effort to address the second research question that guided this study, the researcher conducted a similar process to determine whether a statistically significant difference existed between the mean RIT reading scores of second graders enrolled in four-day per week schools and that of second graders enrolled in five-day per week schools. A paired-samples t-test was conducted to determine if the difference in the means was statistically significant.

Table 6 presents the means and standard deviations of the student RIT scores by school schedule and the 95% confidence intervals for the means. An analysis of the data revealed a statistically significant difference,  $t(15) = -2.39$ ,  $SE = 1.79$ ,  $p = .03$ ,  $d = 0.68$ .

Table 6  
*Mean RIT Reading Scores Grade 2*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	16	188.40 (7.82)	183.56	192.17
Five-Day	16	192.68 (4.19)	190.51	195.23

The resulting p-value ( $p = .03$ ) for the paired-samples t-test comparing second grade reading scores was less than the significance threshold of .05. The resulting evidence did not support the null hypothesis and the researcher rejected the null hypothesis that there was no statistically significant difference in reading achievement as measured by the MAP/MPG between second grade students attending a four-day per week school and second grade students attending a traditional five-day per week school. The mean RIT reading scores of second grade students enrolled in five-day per week schools were higher than the mean RIT reading scores of second graders enrolled in four-day per week schools. The effect size of the difference was medium size ( $d = 0.68$ ). This indicated the four-day per week schedule had a medium negative effect on student reading scores in second grade.

**Third Grade Reading.** The third question in this study wanted to determine whether a statistically significant difference existed between reading achievement of third grade students enrolled in four-day per week schools and those third grade students enrolled in five-day per week schools. A paired-

samples t-test was conducted to compare the mean RIT reading scores of third graders in four-day and five-day per week schools.

Table 7 shows the means and standard deviations of the student RIT scores by school schedule and the 95% confidence intervals for the means. An analysis of the data revealed that no statistically significant difference existed in reading mean RIT scores between third grade students enrolled in four-day per week schools and that of the third grade reading mean RIT scores for students enrolled in five-day per week schools,  $t(14) = -1.14$ ,  $SE = 1.45$ ,  $p = .28$ ,  $d = 0.30$ .

Table 7  
*Mean RIT Reading Scores Grade 3*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	15	199.72 (6.00)	196.39	203.05
Five-Day	15	201.37 (5.11)	198.54	204.20

The difference between the mean scores for third grade reading in four-day per week schools and five-day per week schools was smaller than the differences between the means for first grade reading and second reading. The relative closeness of the means led to a larger p-value ( $p = .275$ ) which guided the researcher to fail to reject the null hypothesis that there was no statistically significant difference in reading achievement as measured by the MAP/MPG between third grade students attending a four-day per week school and third grade students attending a traditional five-day per week school. The effect size for third grade reading was small ( $d = 0.30$ ), but it was in the same direction as was found



at the lower grade levels. This led the researcher to conclude that the four-day per week schedule might have a small negative effect on reading scores for third graders. This conclusion should be investigated in a study with greater statistical power.

**First Grade Math.** The fourth research question guiding this study was to determine whether or not a statistically significant difference existed in math achievement between first grade students attending a four-day per week school and first grade students attending five-day per school as measured by mean RIT scores on the MAP/MPG. A paired-samples t-test was conducted to compare the mean RIT math scores of first grade students.

Table 8 presents the means and standard deviations of the student RIT scores by school schedule and the 95% confidence intervals for the means. An analysis of the data revealed there was no statistically significant difference between the average first grade math RIT scores for students attending four-day per week schools and average first grade math RIT scores for students attending five-day per week schools,  $t(15) = 0.74$ ,  $SE = 2.76$ ,  $p = .47$ ,  $d = 0.23$ .

Table 8  
*Mean RIT Math Scores Grade 1*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	16	183.99 (10.92)	177.72	190.25
Five-Day	16	186.03 (6.07)	182.95	189.75

The resulting p-value ( $p = .47$ ) for the test for first grade math was greater than the significance level of .05. Consequently, the researcher failed to reject the null hypothesis that no statistically significant difference existed for math achievement between first grade students attending four-day per week schools and first grade students attending five-day per week schools. The mean RIT math scores for first grade math students was higher in five-day per week schools than mean RIT math scores for first grade students in four-day per week schools. The effect size for the difference was small ( $d = .23$ ). This indicated a small negative effect on first grade math scores for students enrolled in four-day per week schools.

**Second Grade Math.** The researcher also examined whether a statistically significant difference in math achievement existed between second grade students enrolled in four-day per week schools and second grade students enrolled in five-day per week schools. A paired-samples t-test was conducted to compare the mean RIT math scores of second grade students.

Table 9 shows the means and standard deviations of the student RIT scores by school schedule and the 95% confidence intervals for the means. The paired-samples t-test revealed that a statistically significant difference did exist in the average RIT scores,  $t(15) = 2.94$ ,  $SE = 5.35$ ,  $p = .01$ ,  $d = 0.68$ .

Table 9  
*Mean RIT Math Scores Grade 2*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	16	191.59 (6.46)	187.72	195.08
Five-Day	16	195.52 (5.06)	192.88	198.59

The researcher rejected the null hypothesis that no statistically significant difference between second grade math achievement scores existed between second graders attending four-day per week schools and second graders attending five-day per week schools. The null hypothesis was rejected because mean RIT scores for second grade math for students in five-day per week schools was statistically significantly higher than mean RIT scores for second grade math students in four-day per week schools. There was a medium effect size ( $d = 0.68$ ) for second grade math. This means the four-day school schedule had a considerable negative impact on second graders' math scores.

**Third Grade Math.** In this study, a matched-pairs design was used to determine if a statistically significant difference existed between the mean RIT scores of students enrolled in four-day per week schools and five-day per week schools for the spring 2015 MAP/MPG assessment for math in third grade.

Table 10 shows the means and standard deviations of the student RIT scores by school schedule and the 95% confidence intervals for the means. A paired-samples t-test was employed to compare the mean RIT scores for third

grade math students. The test revealed there was no statistically significant difference between the means,  $t(14) = -1.58$ ,  $SE = 2.24$ ,  $p = .14$ ,  $d = 0.52$ .

Table 10  
*Mean RIT Math Scores Grade 3*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	15	202.05 (8.32)	197.44	206.66
Five-Day	15	205.59 (4.98)	202.83	208.34

A determined p-value ( $p = .136$ ) that was greater than the significance threshold of .05 influenced the researcher to fail to reject the null hypothesis that no statistically significant difference exists for math achievement in third graders. While there was no statistically significant difference between mean RIT math scores for third graders in four-day per week schools and mean RIT math scores for third graders in five-day per week schools it should be noted the mean RIT math scores for five-day per week students was higher than the mean RIT scores for four-day per week students. In addition, the effect size for this test was medium ( $d = 0.52$ ).

There was a larger effect on third grade math than on first grade math. In fact, the effect size in third grade math was higher than the effect size in first grade reading and third grade reading as well. Because this would be a meaningful effect size to detect, it should be investigated in a future study with greater statistical power. The outcome of this test may also have been impacted by the lack of homogeneity of variance on the math tests between the schools on the

five-day per week schedule versus the four-day per week schedule. The students on the four-day schedule not only scored lower on average than the students on the five-day schedule, but their scores showed greater variance as well.

### **Average Daily Attendance Results**

The final research question was to determine whether or not a statistically significant difference in school-wide average daily attendance existed for students attending four-day per week schools and students attending five-day per week schools. A paired-samples t-test was conducted to compare the mean average daily attendance of four-day per week schools with the mean average daily attendance of five-day per week schools.

Table 11 shows the means and standard deviations of the average daily attendance by school schedule and the 95% confidence interval for the mean. The results revealed there was no statistically significant difference,  $t(16) = -1.58$ ,  $SE = .35$ ,  $p = .134$ ,  $d = .38$ .

Table 11  
*Average Daily Attendance*

Schedule	<i>n</i>	<i>M (SD)</i>	95% CI	
			<i>LL</i>	<i>UL</i>
Four-Day	16	94.41 (1.86)	93.42	95.40
Five-Day	16	94.96 (0.84)	94.51	95.41

The difference in the mean average daily attendance for students enrolled in four-day per week schools and the mean average daily attendance for students enrolled in five-day per week schools was small and not statistically significant.

Therefore, the researcher failed to reject the null hypothesis that no statistically significant difference between four-day and five-day per week schools' average daily attendance exists. However, the effect size was 0.38 which led the researcher to the conclusion that even though the means appeared close, the four-day per week schedule may have some negative effect on average daily attendance.

### **Summary of Results**

In second grade, the mean RIT scores for reading and math were statistically significantly higher for students attending school in five-day per week schools than for students attending school in four-day per week schools. Although differences in mean RIT scores in reading and math in grades one and three were not statistically significant, in both grades and in both subject areas, the mean RIT score for five-day per week schools was higher than the mean RIT score for four-day per week schools. So, while the differences were not statistically significant, consistent but small differences in mean scores were evident.

For this study, the standard error of the means is large, in part due to the small sample size of the study. The assumption of homogeneity of variance may have been violated for second grade reading results and for first grade math results. This was, in part, due to the small sample size of the study.

The effect size for second grade reading was 0.68 and 0.69 for second grade math. The greatest effect of the four-day per week school schedule on student learning occurred in both content areas for second grade students. While the differences between the means for four-day per week schools and five-day per week schools were not statistically

significant for first grade reading and math and third grade reading and math, the effect sizes of all three grade levels and both content areas were of sufficient size to take note of them. Outside of second grade, the largest effect size occurred in third grade math ( $d = 0.52$ ).

The average daily attendance of students in four-day per week schools was not statistically significantly different than the average daily attendance of students in five-day per week schools. However, the effect size of the difference was 0.38; which indicates the school calendar may have some effect on student attendance. The interpretation of this data and the implications of the results will be discussed in Chapter 5.

## **CHAPTER V**

### **Conclusion**

This quantitative study used a matched-pairs design to determine whether a statistically significant difference existed in the reading and math achievement of students in first through third grades enrolled in four-day per week schools as compared to achievement of students in first through third grades enrolled in five-day per week schools in Colorado, Montana, and Wyoming. This chapter will provide a summary of the results generated and conclusions reached. This chapter will also discuss the implications for practice and recommendations for further research.

School districts face tough decisions regarding how to trim budgets, address public expectations, and meet accountability standards. Unfortunately, it seems that all too often the order in which school issues are addressed are based primarily on financial considerations, which take precedence over the academic well-being of students. The number of school districts across the country that are employing a four-day school week continues to grow (Layton, 2011). School decision makers look at the four-day school week as a way to reduce the cost of transportation, school meals, and fixed costs such as heating and cooling. The decision to adopt the four-day calendar has been made despite limited research into the impact on student learning. Not only is there still debate about



the impact the four-day school schedule has on student learning, there is no conclusive evidence that there have been any significant financial savings.

Another motivating factor that leads school decision makers to adopt the four-day schedule has been to accommodate interscholastic sports schedules. This decision represented another instance of the secondary aspects of education taking priority over the primary goal of public schools; to provide a quality education for all students. Due to limitations with school bussing, high school activity schedules often influence which days elementary students have been able to attend school. This seemed like an ineffective way to determine the best school schedule for students.

It had been well established that literacy and numeracy skills are some of the most important skills that students must acquire in early grades in the American education system. These skills not only lay the foundation for later academic success in literacy and numeracy, they have also been major predictors of success in life after high school (Lesnick, Goerge, Smithgall, & Gwynne, 2010; Flawn, 2008). School leaders are encouraged to focus their decision-making on ways to improve the academic success of students in the early grades. A focus on saving money and accommodating extra-curricular school activities should never take priority over the learning of students at any grade level. When finances and athletics get in the way of learning, school and community leaders have allowed secondary and tertiary priorities to circumvent the most important purpose of our public schools.

These skewed priorities of practice led the researcher to wonder if the four-day school schedule had any impact on student learning in early grades. A careful review of the published literature found there were no empirical studies published that investigated

the impact of the four-day school schedule on learning in the primary grades. Studies have been completed that analyzed state-mandated test results, but these studies generally considered student achievement in grades higher than third grade, and have been largely inconsistent and inconclusive. According to Hewitt and Denny (2011), it does not appear student academic achievement should be used as a reason not to implement a four-day school week. Anderson and Walker (2012) analyzed student achievement in grades four and five and found that the four-day week did not appear to have an impact on student learning. In the early 1980s, Daly and Richburg (1984) examined test scores for students in grades three through seven and found that there was no evidence to suggest student achievement was effected by a change to a four-day school calendar. Lefly and Penn (2011) studied Colorado student achievement in grades three through 12 and found no statistically significant difference in the scores of students attending four-day per week schools and the scores of students attending five-day per week schools. Hewitt and Denny (2011) found that students enrolled in grades three through 11 in five-day per week schools scored higher than students enrolled in four-day per week schools, though the differences were only statistically significant in third grade writing.

Sagness and Salzman (1993) studied the effects of the four-day calendar for students in grades five, six, seven, and 11. The results of the study revealed that the only statistically significant decreases in student achievement scores after the implementation of the four-day school week came in fifth grade math and social studies, eighth grade language skills, and eleventh grade work study skills and social studies. Sagness and Salzman (1993) also found statistically significant increases in sixth grade language skills

and total composite scores for sixth grade students following the adoption of the four-day per week schedule.

Miller-Hale (2010) reported some school districts in South Dakota reported increases in eighth grade composite scores, while other school districts reported decreases in eighth grade level composite scores following the adoption of the four-day school calendar. Feaster (2002) reported that scores for South Dakota second, fourth, and eighth graders have fluctuated above and below state averages since the adoption of the four-day school week. Tharp (2014) found that student achievement scores on state-mandated standardized tests improved over previous years in the initial year of adopting a four-day per week school schedule. However, over time, student achievement began to decline in four-day per week schools and was statistically significantly lower than state averages over three years. Of the studies cited, only two, Feaster (2002) and Daly and Richburg (1984) studied student achievement in grades lower than grade four. These studies included third grade student achievement scores.

This study was designed to compare the achievement in reading and math of first, second, and third grade students enrolled in four-day per week schools with the reading and math achievement of first, second, and third grade students enrolled in five-day per week schools. The participants in this study were from four-day and five-day per week schools from across Colorado, Montana, and Wyoming. Sixteen matched pairs, or thirty-two schools, were identified for participation in this study. Each four-day per week school was matched with one five-day per week school based on the state in which the school was located, the grade-level enrollment of first, second, and third grades, free and reduced lunch data, and the use of Northwest Evaluation Association (NWEA) Measure

of Academic Progress (MAP) or Measure of Academic Progress for Primary Grades (MPG).

### **Conclusions**

The results of the study yielded only two statistically significant differences between student achievement in the four-day per week classes and the five-day per week class. These statistically significant differences were identified in second grade reading and second grade math. The results for student achievement in reading and math in first and third grades did not yield any statistically significant differences. However, in all cases, the four-day per week mean RIT scores for reading and math were lower than the mean RIT scores for reading and math in five-day per week schools; suggesting that the four-day per week school schedule may have some negative impact on student achievement. This potential impact was verified by conducting Cohen's  $d$  tests for effect size. In all grade-levels and in both content areas, there was at least a small effect size identified. This led the researcher to conclude that, while the results were not statistically significant, the four-day school week does appear to have a negative impact on student learning in early grades.

The researcher also examined the impact the four-day per week schedule had on school-wide average daily attendance. The difference between the mean four-day average daily attendance and the mean five-day school-wide average daily attendance was not statistically significant. However, there was a small effect size ( $d = 0.38$ ); indicating that the four-day per week may have some negative impact on student attendance.

### **Implications for Practice**

Practitioners should be cautious in their analysis of the results of this study. The sample size, and therefore, the power of this research study were small. Consequently, it is difficult to make generalizations about the results of this study to the entire population of four-day per week schools. What can be gleaned from this study is that serious consideration should be given to how the four-day school week might impact student learning; especially in primary grades, which has many long-term implications for student learning.

When school personnel, community leaders, and school board members are considering the adoption of the four-day school week, whether for financial, athletic, or other reasons, they should take into consideration the impact the proposed calendar may have on student learning. From this study it can be suggested the achievement level of students who attended school for four-days per week may be impacted. There are still uncertainties that exist concerning the depth of the impact the four-day school schedule had on student learning. Further research on this subject is necessary before a definitive answer can be give regarding the intensity of the impact the four-day calendar has on student learning.

### **Recommendations for Further Research**

This study was limited by a very small sample size. Future studies comparing student achievement of students in four-day per week schools with student achievement in five-day per week schools will need to include a much larger sample so that any differences that may exist can be generalized to the larger school population. In addition,

a larger sample size will address issues associated with the assumption of homogeneity of variances.

When school calendars are adjusted to accommodate a four-day per week school schedule one of the important questions to be addressed is related to the educational purpose of the fifth, non-instructional day. Some school systems have a day off with no teachers or students attending school or trainings. Others use these non-instructional days for teacher professional development or student tutoring. Even in those models that use the non-instructional day for some educational activities it would be valuable to know the impact of these days on student learning, financial savings, or stakeholder perceptions of the four-day week.

Tharp (2014) investigated the long-term effects of the four-day school week schedule on student learning. Tharp's research showed that student achievement scores initially improved with the adoption of a four-day school calendar. However, over time those increases in student achievement dwindled and students attending school in four-day per week schools scored lower on state-mandated achievement tests than the state average. Research could be conducted to determine the cause of those initial gains and the subsequent decreases in student achievement.

It would be beneficial for a longitudinal study to be replicated with other sample populations. Tharp (2014) was the only study reviewed that investigated the long-term impacts of the four-day schedule on student learning. Conducting longitudinal studies would make the findings more complete and more generalizable to the school population.

Questions still exist as to whether school districts actually save money when a four-day school week is adopted. There are many challenges in analyzing financial

savings for schools including the use of the non-instructional day, the funding from the state for services such as transportation; and other activities that occur at school on the non-instructional day. Conducting empirical research focused solely on the financial impact of the four-day school schedule would be beneficial to decision makers.

Longer school days seem to make younger students more tired as the day progresses. It is sometimes difficult for younger students to stay focused and engaged during the longer days that accompany a schools district's adoption of a four-day calendar. Research should be conducted to determine if younger students are able to attend to learning with longer school days.

One of the major questions that still exist in the body of research is the impact that the four-day school week has on sub-populations of school students. An achievement gap already exists for many special education, minority, low-income, and limited English proficient students. Educational stakeholders need to know whether the four-day per week schedule negatively impacts these students before a decision to adopt a four-day school week is made.

## **Summary**

Early literacy and numeracy skills are critical foundational academic skills in the modern American educational system. These skills are major predictors of future academic and career success (Lesnick, Goerge, Smithgall, & Gwynne, 2010; Flawn, 2008). No school budget, no matter how tight, and no sports calendar should ever interfere with the responsibility of the school district to provide the best possible learning environment for all students, especially those students who are developing these critical foundational skills. The argument that a four-day calendar will save money is weak when

compared to the argument that students perform better on academic assessments when they attend school for five-days each week. Further, the proposition that adopting the four-day calendar allows interscholastic participants the opportunity to participate in their activities without missing so many school days is unsubstantiated and suspect when compared to the potential loss of learning that takes place when all students miss one day of school each week. Student learning and achievement are critical areas that educational leaders cannot afford to risk or take lightly



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