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Relationship Between Time Allocated to Instruction and Elementary Student Achievement Across Select Minnesota Public Schools

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Relationship Between Time Allocated to Instruction and Elementary Student Achievement Across Select Minnesota Public Schools

by

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Abstract

This study investigated the amount of instructional time allocated tp reading/language arts, mathematics, science, social studies, art, music, and physical education as reported by select public elementary schools in Minnesota during the 2018-2019 school year. The purpose of this study was to investigate the average amount of time allocated to each subject area, as well as the correlation between the amount of time allocated and the relationship to student achievement outcomes in both reading and mathematics as measured by the Minnesota Comprehensive Assessments (MCAs).

This quantitative study collected and utilized secondary data which was gathered from the Minnesota Department of Education's data center via a public data request. The findings of this study reported the average amount of time allocated to instruction in each subject area as reported by 68 select public elementary schools in Minnesota. The findings of this study also reported the effect size of the relationship between the amount of time allocated to instruction and student achievement outcomes.

The findings of this study suggested that a majority of reported instructional time allocations were devoted to tested subjects, similar to the findings of previous research (Center on Education Policy, 2008; Judson, 2013). The findings of this study also noted significant positive relationships between the amount of time allocated to both reading/language arts instruction as well as physical education instruction.

Key words: *elementary, instructional time, student achievement*

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Finally, to my husband, Tyler, thank you for your patience, love, and encouragement to continue to achieve my goals.

Dedication

I dedicate this dissertation to all the educators who strive to make change throughout the education system. When we know better, we can do better, and we must continue to use our insight to advocate for meaningful opportunities for our students and communities.

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Chapter I: Introduction

What if schools could sustain higher levels of achievement in less time? The Organization for Economic Cooperation and Development (OECD) reported in 2018 that the average elementary student in the United States spends approximately 971 hours each year receiving instruction in a variety of subject matter. That is 172 more annual hours than the average OECD member nation (2018). Meanwhile, the OECD (2018) also reported that the United States was scoring lower than multiple nations who required less instructional time for their similarly aged students. When looking at time and achievement domestically, the data again showed a similar pattern. It was shown that states requiring less instructional hours than the average, 971 hours, did not guarantee higher levels of success (United States Department of Education, 2019).

In 2002, the No Child Left Behind Act (NCLB) was adopted in the United States, and with it came increased accountability for schools and states to increase student achievement (Center on Education Policy, 2008). Studies conducted prior to this time focused primarily on the amount of time allocated to instruction across schools, rather than the correlations between time and achievement (Caldwell et al., 1982). Several studies also supported a link between the enactment of NCLB and schools beginning to focus their instruction on those areas which would be tested and subsequently used in state accountability measures (Judson, 2013). This was demonstrated by the abundance of research focused primarily on literacy instruction and achievement (Gettinger, 1985, 1989; McIntyre et al., n.d.). Literature and data originating after the enactment of NCLB exposed a narrowing of curriculum (Center on Education Policy, 2008; Holt, 2002; Judson, 2013).

This study served as an important reminder for policy makers and educational administrators to be mindful of the holistic and comprehensive role curriculum has played in the overall achievement of students, including the teaching of the social sciences, fine arts, and physical education. It is important for these decision makers to have a comprehensive understanding of the structural issues that impact student achievement.

This knowledge could be used to inform decision making at multiple levels and is crucial for both state and local leaders in education as time is quite possibly the one resource which has the most flexibility in availability and usage.

Statement of the Problem

The review of literature revealed that there was limited research exploring the relationship between the amount of time allocated to instruction and student achievement at the elementary level. While the related literature and data indicated a narrowing of curriculum across public schools throughout the United States, the research did not examine the impacts of instructional time reallocations in multiple subject areas on student achievement, including those which were not formally assessed by state measures.

Purpose of the Study

This study examined the extent to which there is a relationship between time allocated to instruction in the subject areas of reading/language arts, mathematics, science, social studies, art, music, and physical education and student achievement in reading and mathematics for grades three through five across Minnesota's public elementary schools. This study also examined to what extent time is allocated to instruction in multiple subject areas which are not formally assessed to determine if there appeared to be any impacts on student achievement. The related

literature indicated that over the past two decades, instructional time for non-tested subjects has been reduced to allow for instructional time to be increased for the tested subjects of reading and math. As social studies, art, music, and physical education are non-tested subjects, this study aimed to investigate the relationship that instruction in these subjects had to student achievement. The relationship between science instruction and student achievement was also investigated along with other non-tested subjects as science was originally a non-tested subject.

Research Questions and Hypothesis

The following questions were used to guide the investigation of the relationship between time allocated to instruction and student achievement across public elementary schools in Minnesota.

1. To what extent was time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five across select Minnesota public elementary schools during the 2018-2019 school year?
2. To what extent was there a relationship between time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five during the 2018-2019 school year and student achievement as measured by the 2019 Minnesota Comprehensive Assessments in Reading and Math across select Minnesota public elementary schools?
    a. Alternative Hypothesis: There was a significant relationship between the amount of time allocated to instruction in Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five and

student achievement as measured by the Minnesota Comprehensive Assessments in Reading and Math.

b. Null Hypothesis: There was no significant relationship between the amount of time allocated to instruction in Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five and student achievement as measured by the Minnesota Comprehensive Assessments in Reading and Math.

Conceptual Framework

The conceptual framework for this study was built on the belief that policy makers throughout the history of the United States have felt that the nation was falling significantly behind other industrialized nations following the release of the report *A Nation at Risk* in the early 1980s (Center on Education Policy, 2008). The researcher further understood that the school environment had been impacted by the inception and implementation of the No Child Left Behind Act, as well as its federal reauthorization as the Every Student Succeeds Act of 2015 (Association for Supervision and Curriculum Development, 2015). Legislation at the state level included Read Well by Third Grade (Minn. Stat. § 120B.12, 2001) which set an expectation for reaching 100% proficiency in reading for all students as well as other performance markers as outlined in the World's Best Workforce (Minn. Stat. § 120B.11, 2013). Judson (2013) and other researchers supported the notion that there had been a narrowing of curriculum to focus on those subject areas that would be measured by standardized assessments as outlined in federal law. This narrowing reallocated time from multiple subject areas to increase instructional time for reading and mathematics (Center on Education Policy, 2008).

Additionally, the literature had focused primarily on one of the two variables being considered in this study. Therefore, it was important to consider the significance of providing instruction in multiple subject areas to our youngest learners.

Overview of Research Methods

This study analyzed the extent to which the amount of time was allocated to instruction in reading/language arts, mathematics, science, social studies, art, music, and physical education in grades three through five as well as the correlation between the amount of time allocated to subject matter instruction and student achievement in reading and math as measured by the Minnesota Comprehensive Assessments. The researcher collected public secondary data from the Minnesota Department of Education which included instructional time allocations and student achievement proficiencies from public elementary schools in Minnesota for the 2018-2019 school year. Using descriptive statistics, and correlation tests, the data was analyzed to measure the averages in the amount of allocated instructional time, as well as the relational strength between each variable.

Assumptions of the Study

The following are statements which were assumed by the researcher to be true related to this study:

1. Time Allocation data was accurately reported by school districts to the Minnesota Department of Education.
2. Student Achievement data was accurately reported by the Minnesota Department of Education.

3. Elementary schools in Minnesota provided encore instruction in art, music, and physical education at a minimum across all grades three through five.

Delimitations

Hyatt and Roberts (2019) defined delimitations as the boundaries of a study which indicate how the researcher has narrowed their scope. The following were the delimitations the researcher used in this study:

1. The study only included public non-charter elementary schools in Minnesota.
2. The study included elementary schools which encompass kindergarten through fifth grade in their configuration.
3. The study only utilized data collected by the Minnesota Department of Education for the 2018-2019 school year to avoid potential educational impacts stemming from the COVID-19 pandemic.
4. The study only included schools in the sample which reported time allocations for all seven subject areas identified in the research questions.
5. There are only statewide standardized assessments for multiple elementary grade levels in reading and math, leaving out achievement data for other content areas such as science, social studies, art, music, and physical education.
6. The study only investigates the relationship between instructional time and student achievement and does not take other variables into consideration which may impact student achievement outcomes.

Definition of the Terms

Core Instruction refers to learning activities where students are receiving instruction in "reading, mathematics, science, and social studies" (Rosenshine, 1981, p. 43).

Encore Instruction refers to learning activities where students may be receiving instruction in subject matter outside of those listed under "core instruction". These activities generally include art, music, physical education, or other special courses (Smith, 2000).

Instructional Time refers to the amount of time devoted to both core and/or encore subject matter learning activities. Non-Instructional activities are not included in the calculation of instructional time. (Rosenshine, 1981).

Non-Instructional Activities refers to the amount of time when there is no instruction given. These activities include transitions/passing time, lunch, recess, and other class business (Rosenshine, 1981, p. 43).

Student Achievement refers to assessment scores in terms of proficiency as determined using a standardized assessment to measure competency in reading and mathematics. These assessments include the Program for International Student Assessment (PISA), the National Assessment of Educational Progress (NAEP), and the Minnesota Comprehensive Assessments (MCAs).

Overview of the Study

The study was organized into five chapters. Chapter I provided an overview of the rationale for this study. Chapter II explored related research which had been conducted over the past 40 years regarding the length of the school day and year, as well as time allocated to both core and encore instruction. Chapter III then explained the methodology and research design used to conduct this study and address the research questions outlined in Chapter I. Chapter IV reported the results of the study and provided an analysis of the data. Finally, Chapter V provided the conclusions and recommendations for the field and future research.

Chapter II: Literature Review

The review of literature included research spanning the past 40 years. The quantity of hours per year allocated to instruction was both guided and mandated by education policy at the local, state, and national levels (Woods, 2015). There have been historical changes in the United States since the publication of *A Nation at Risk* in 1983 and after the implementation of No Child Left Behind (NCLB) in the early 2000s (Center on Education Policy, 2008). The Education Commission of the States (ECS) indicated that across the nation, school-aged children devoted hundreds of hours each year to their education (ECS, 2020). Previous research has done little to ask how, or if, instructional time impacts the educational achievement of students, which may lead education policy makers and school administrators to consider how the allocation of time resources impacts achievement outcomes (Caldwell et al., 1982).

The review of related literature explored international and national policy, and perspectives surrounding instructional time and academic achievement, how time was allocated to various core and encore subject matter at the elementary level in the United States and investigated multiple factors which may impact the quality of instruction.

Comparison of Education Policy

To better understand the impact that instructional time had on educational achievement, there must be an understanding of the foreign and domestic policies related to instructional time as well as how education is perceived in various contexts.

International Perspectives and Policies

The range of mandated instructional time in public elementary schools varied greatly around the world (OECD, 2018). Data showed that across the 35 countries comprising the

international Organization for Economic Cooperation and Development (OECD), only the children in three countries spent more time in school annually, on average, than children in the United States. Thirty OECD countries required less annual instruction time than the United States (OECD, 2018). At the elementary level, students spent an average of 799 instructional hours in schools annually, with Latvian students spending the lowest amount of time at 599 hours and Danish students spending the highest amount of time at 1,051 hours on average (OECD, 2018). At the secondary level, there was a similar range as in "Belgium, France and Greece, pupils aged 15 have an average of over a thousand hours per year of total compulsory classroom instruction while in England, Luxembourg and Sweden the average is only 750 hours per year" (Lavy, 2010, p. 1).

The OECD used an assessment in reading, mathematics and science known as the Program for International Student Assessment (PISA) which has been given every three years to a selection of 15-year-olds in participating countries (Lavy, 2010). The PISA assessment examined a students' ability to "apply knowledge and skills in key subject areas and to analyze, reason and communicate effectively as they examine, interpret and solve problems" in addition "students answer a background questionnaire, providing information about themselves, their attitudes to learning and their homes" (Lavy, 2010, p. 7-8). Lavy (2010) examined if these large differences in instructional time explained some of the differences in pupils' achievements in different subjects across countries and found that the relationship between instructional time and test scores on the 2006 PISA exams were positive and highly significant. They also suggested that evidence on the effects of classroom instructional time would be important for policy as it is "relatively simple to increase instructional time" (Lavy, 2010, p. 2). Findings from an OECD

sample demonstrated that one additional hour of instruction increased test scores by 0.15 standard deviations (Lavy, 2010).

Table 1 below showed the four OECD countries with the lowest and highest amounts of annual instructional time for elementary (primary) aged students and the corresponding test scores of 15-year-olds on the PISA assessment as reported in 2018.

Table 1

Average Hours of Instruction and PISA Achievement Levels Reported by OECD

Country	Instructional Hours	Reading Achievement*	Mathematics Achievement*
Latvia	599	77.6%	82.7%
Poland	619	85.3%	85.3%
Finland	651	86.5%	85.0%
South Korea	655	84.9%	84.9%
OECD Average	799	77.3%	76.0%
United States	971	80.7%	72.9%
Australia	1,000	80.4%	77.7%
Chile	1,039	68.3%	48.0%
Denmark	1,051	84.0%	85.4%

**OECD (2018), PISA (2018)*

Making significant changes to instructional time may be simple in theory, however Barrios and Bovini (2017) suggested that it is an area highly debated as it is tied significantly to public funding. For example, 1984 estimates put the annual cost of adding 20 days to the average 180-day school year in the United States at $20,000,000,000 to $22,000,000,000 dollars

(Adelman et al., 1996). Barrios and Bovini (2017) also found that in 1997, when the Chilean government lengthened the school day by between 45 and 120 minutes in grades 1 to 4, operating costs also increased by between 25% and 50% depending on the grade level. They also stated that the benefits of increasing time can vary based on how effectively the time is used and therefore offer some insights into issues related to restructuring instructional hours on a large scale (Barrios & Bovini, 2017). When Barrios and Bovini (2017) compared the increase in instructional time to student achievement, they found small positive increases in reading scores (0.017-0.020) and mathematics scores (0.003-0.006) amongst fourth graders who took the standardized assessment between 2005 and 2013. Dobbie and Fryer (2013) found that at least a 25% increase in instructional time raised achievement by 0.059 in mathematics and 0.015 in reading. Studies such as these suggest that the quality of instruction is a key factor in cultivating positive outcomes.

Barrios and Bovini (2017) also indicated that students from disadvantaged backgrounds benefitted more from an increase in time than their affluent peers. Researchers in Italy stated similar findings:

> The idea behind extra teaching time lies in the simple consideration that the more the student is exposed to school time, the more s/he will learn in a cumulative process. Extra education is also generally conceived to have other side-benefits: it decreases the influence of the family in the case of students from low socioeconomic backgrounds, and it decreases the negative influence of peers in the case of students exposed to behavioral risks. (Abbiati & Meroni, 2016, p. 594)

Italian students who participated in additional learning activities (approximately 30 to 60 hours) showed an estimated increase of 0.12 standard deviations on the Istituto Nazionale per la Valutazion del Sistema Dell'Istruzion (INVALSI) test (Abbiati & Meroni, 2016). The INVALSI test was introduced to elementary students in the 2007-2008 school year and is now taken by students in grades two, five, six, and eight (Abbiati & Meroni, 2016). The researchers also found results of achievement on other variables. Abbiati and Meroni (2016) noticed that "boys receiving extra time in language, lowered their performance in mathematics and showed a decrease in positive attitude towards that subject" and for "girls they observed the reverse situation: girls who receive more instruction time in mathematics showed a significant increase in maths scores and a small increase in language performance as well as positive attitudes towards the subject" (p. 604).

Cattaneo et al (2017) suggested that the effect of an additional hour of instruction yields only one third to one half the effect of an average hour of instruction on PISA scores. Data from the 2018 PISA exams correlated with these understandings as when observing the achievement of countries such as Poland, Finland, and Denmark, it can be noted that although these three Baltic nations have similar achievement scores, they allocated vastly different amounts of instructional time resources at the elementary level (OECD, 2018). Therefore, the goals of increasing instructional time should be thoroughly understood before allocating additional resources, considering that 54 percent of industrialized nations implement a total number of instructional hours below the average of all OECD countries and over 85 percent of industrialized nations implement a total number of instructional hours below the average across the United States (OECD, 2018).

Policies and Perspectives Across the United States

Since the publication of *A Nation at Risk* and the adoption of No Child Left Behind, schools in the United States have looked for ways of improving achievement outcomes for students at all levels (Woods, 2015). While some researchers and policy makers have supported increasing total instructional hours, other researchers such as Adelman et al (1996) assert that "there is little or no rigorous research evidence demonstrating that longer blocks of instructional time produce improved student outcomes" (p. 4). The 1983 report by the National Commission on Excellence in Education, *A Nation at Risk,* recommended that schools and districts adopt a seven-hour school day and extend the school year from an average 180 days to between 200 and 220 days (Woods, 2015). As previously mentioned, 1984 estimates suggest that it would cost approximately $1,000,000,000 to $1,100,000,000 dollars for each added instructional day across the country (Adelman et al., 1996). Between 1985 and 1990 seven states increased the length of the instructional day, however, between 1990 and 2014, 16 states removed the instructional day length and began mandating a total number of instructional hours per year (Woods, 2015). Since NCLB was enacted during the 2002 school year, many districts began adding time for instructional activities (Center on Education Policy, 2008).

Table 2 below showed the four states with the lowest and highest amounts of required annual instructional time for elementary students in the United States and Minnesota, as of 2020, and the corresponding test scores of fourth graders demonstrating a Basic level of proficiency on the National Assessment of Educational Progress (NAEP) assessments in 2019.

Table 2

Average Hours of Instruction Reported by ECS and NAEP Achievement Levels

State	Instructional Hours	Reading Achievement	Mathematics Achievement
New Jersey	720	72%	85%
Arizona	712-890	61%	77%
Florida	720-900	70%	87%
Alaska	740-900	53%	73%
Minnesota*	935	69%	85%
U.S. Average**	969	65%	80%
Michigan	1,098	64%	76%
Kansas	1,116	66%	79%
Tennessee	1,170	66%	79%
Texas	1,260	61%	81%

Note. 2020 Instruction Time for grades 1-5 (ECS, 2020) and 4th Grade NAEP Proficiencies (United States Department of Education, 2019).
*Minnesota listed as a reference point only. There are 20 states that require less annual instructional time than Minnesota according to the 2020 ECS report.
**U.S. Average calculated using times reported for grades 1-5 and excludes data not reported by the ECS for Arkansas and Vermont.

Although the research of Adelman et al. (1996) did not correlate increased time with achievement, they did find positive change amongst other indicators that helped reduce overall school failure amongst at-risk students. They went on to suggest that:

> Simply adding more classroom time to the school year or day is a weak reform strategy. More academic time is not necessarily needed if there is flexibility to reconfigure existing time in ways that make more sense to students and teachers. Extending noninstructional

> time at school has important impacts on students. Flexibility of education time is an especially important characteristic for schools that serve students at risk of school failure. (Adelman et al., 1996, p. 47)

Adelman et al's (1996) research suggests that adding time to the school day must be purposeful not only for students, but also for teachers. Implementing new innovations takes time for planning and therefore we must allocate time for teachers to work collaboratively with their colleagues to plan and implement classroom-based innovations (Adelman et al., 1996). Beginning in 1981, researchers began to consider elements of teacher effectiveness as part of school improvement strategies (Stringfield & Teddie, 1988). Stringfield and Teddie (1988) surveyed 76 elementary principals, 250 3rd Grade Teachers and 5,000 3rd Grade students regarding school climate and self-concept. They found that teachers' and principals' long-term expectations for student achievement were highly correlated to socioeconomic status, however, they also noted other factors aside from socioeconomic status: (1) student perception of academic climate, (2) principals' sense of school efficacy, (3) family commitment to education, (4) student sense of long-term educational achievement, and (5) absence of negative school climate (Stringfield & Teddie, 1988). While teachers' and principals' expectations for students were correlated to socioeconomic status, students' expectations were not (Stringfield & Teddie, 1988). Stringfield and Teddie's (1988) research summarized that "schools become more effective when students receive more effective teaching" (p. 45). This shed a light on perceptions by educators and educational leaders, that time devoted to instruction is only an effective school improvement strategy if there is purposeful planning and effective instruction occurring during the additional time.

Other attempts to improve student academic outcomes came through the implementation of extended and expanded learning time. These programs aim to increase exposure to instruction for students beyond the traditional school time for economically disadvantaged students and families, including approaches such as: “Out-of-school programs, summer schools, expanded learning time schools, and year-round schools” (Kidron & Lindsey, 2014, p. 2). During the 1999-2000 school year, Kidron and Lindsey (2014) reported that approximately half of struggling schools in New York City implemented extended learning time (ELT) programs. The goals of these programs were to improve proficiency in reading and math and reduce the percentage of students scoring at the lowest levels on the city and state tests (New York City Board of Education, 2000). Kidron and Lindsey’s (2014) analysis found that students who were enrolled in Extended-Time programs scored 1-2 percent higher in both reading and mathematics and reduced low achievement levels by 2-4 percent (New York City Board of Education, 2000). In the early 2000s, Massachusetts elementary schools began implementing Expanded Learning Time (ELT) policies which required at least 300 additional hours of instruction per year, with a major goal being to increase student achievement (Checkoway et al., 2013). This research found that approximately five out of eight hours of school were allocated to core academic instruction. Schools reported that teachers, staff, and students experienced more fatigue with the longer school day. They also found that there were no significant effects on student achievement in reading or mathematics (Checkoway et al., 2013). When Kidron and Lindsey (2014) studied the effects of 30 studies of extended learning programs on student achievement and other outcomes through a metanalysis of studies that had mostly been completed in the five years leading up to their publication, they determined that an effect size of 0.25 would be educationally significant.

They found that “increased learning time programs had a positive effect on students’ academic motivation but not on literacy or math achievement” as their effect size was found to be only 0.07 for elementary students (Kidron & Lindsey, 2014, p. 5). Each of these studies indicated that while there were some improvements in student achievement outcomes in schools that implemented extended learning programs, those increases were relatively small.

Another perspective to time in school concerns itself with the impact that school start times have on students’ academic performance. As of 2019, multiple states have begun legislating to push back school start times to help combat the ramifications of sleep deprivation (Pompelia, 2019). Research published by the American Psychological Association (2014) found that the relationship between earlier start times and lower academic achievement may be explained by the “ramifications of sleep deprivation” in more affluent communities and schools (American Psychological Association, 2014, p. 60). They also suggested that pushing back start times for secondary school students while making start times earlier for elementary school students may “simply be shifting the problem from adolescents to younger children” (American Psychological Association, 2014, p. 60). They suggested that the reason they did not see as much correlation with disadvantaged students and schools is that there are so many other factors in play with those communities that it becomes more difficult to pinpoint a single impacting factor. Mixed results have been found with schools implementing earlier start times. According to Dupuis (2015), early start schools outperformed later start schools between 2010-2011, by 2012 they showed similar performance and then began to decline in achievement comparisons from 2013-2015. Kubow et al (1999) reported that during the 1997-98 school year, the Minneapolis Public School district began wide sweeping changes to school start times across their schools.

All secondary schools changed to having later start times, while there were three different start times across the district's 71 elementary schools to accommodate transportation (Kubow et al., 1999). The study found that elementary schools who adopted a later start time of 9:40 had negative effects on student engagement and learning, similar to schools who made a two-hour time change to either an earlier or later start time. Schools that implemented an earlier start time with only a one-hour time change noted positive impacts on student outcomes (Kubow et al., 1999). Again, making changes to this element of school schedules needs to take into consideration a variety of factors beyond operational structuring.

When synthesizing the literature related to school improvement efforts across the nation over the past three or four decades, it was noted that increased learning time had shown different effects for different groups of students. Revisiting the data from ECS and the NAEP, there again appeared to be mixed achievement results throughout the states as high and low achievement on national assessments have not appeared to cluster amongst states who have mandated either higher or lower cumulative instructional time (Education Commission of the States, 2020; United States Department of Education, 2019). Similar to international data, it was worth noting that there were achievement levels above the national average within states implementing both high and low instructional time mandates (Education Commission of the States, 2020; United States Department of Education, 2019). When planning strategies to reach academic achievement goals, educational administrators and policy makers should also consider the costs and benefits associated with requiring more or reducing instructional time. Noting these surface level analyses has led researchers to consider the next related topic within the literature, how time is allocated during the school day and year to specific subject matter instruction.

Instructional Time and Practices

In continuing to build an understanding of the policies and perspectives related to total instructional time spent in compulsory school across the globe, research was reviewed which investigated how time has been allocated to specific subject matter instruction within the school day, across the nation's schools. Woods (2015) stated that research on how time allocated to instruction is utilized is overall limited. Earlier research focused on reporting the status of time allocations and the organization of schools, they did not link their studies of these allocations to the correlation with student achievement outcomes (Caldwell et al., 1982). Therefore, this section focused on research related to time allocated to core subjects such as: reading/language arts, mathematics, science, and social studies, and time allocated to encore subjects such as: art, music, and physical education, along with their relation to student outcomes.

Structure of the School Day

Prior to the enactment of NCLB, Smith (2000) investigated how much time students spent actively engaged in academic learning during their school day, across elementary schools in the Chicago Public School system. Smith's (2000) research utilized data from three years of visits to area elementary schools where observers documented over 70 teachers instructing more than 300 periods of language arts, mathematics, social studies, and science in grades 2, 5, and 8. "The objective was an assessment of total learning opportunity, so core academic time was not isolated from "encore" time spent on music, art, physical education, computers, or in the library" (Smith, 2000, p. 658). According to the National Center for Education Statistics (1991) most elementary schools in the U.S. reported between 330 and 345 minutes of daily instruction across grade levels (Smith, 2000). The study found that an average of 23% of time was absorbed by

noninstructional activities, with a range of 14-30% amongst more and less effective teachers (Smith, 2000). Findings indicated that on average, only 40-60% of allocated time was spent on instruction (Smith, 2000). Organizational structuring was also considered to have played a part in the low availability to academic learning time as several opportunities were stolen by special events throughout the school year (Smith, 2000). Overall, it was found that the "overriding determinant of daily instruction time was allocated time" and that classroom management only accounted for small ranges of increased opportunities for student learning (Smith, 2000, p. 664). Finally, Smith (2000) surmised that additional time in the school day was ineffective if solid instructional practices were not in place.

Core Instruction Time and Practices

First researchers must understand how time within the elementary school day is allocated amongst various areas of subject matter. Further research investigated the relation to and impact on specific subject matter areas which fall into the "core" instruction umbrella: reading/language arts, mathematics, science, and social studies.

Research by Rosenshine (1981) found that by the 1980s, typical second- and fifth-grade students spent 135 and 170 minutes per day on academic activities respectively. Rosenshine (1981) also found that students were actively engaged for only 90 to 115 of those allocated minutes. They considered that perhaps less than two hours of engaged time may not be adequate for low-achieving students, however they were unsure if additional time could or would be used more effectively (Rosenshine, 1981). Over the next twenty years, policy changes began to take shape with the culminating passage and enactment of No Child Left Behind. Therefore, there

was also an important distinction to be made when comparing international policies to national policies:

> Unlike many other nations, education in the United States is not under precise national control. A narrowed curriculum is commonly typified as being tapered in favor of concentrating on reading and mathematics. A good deal of literature in the past several years has supported the idea that No Child Left Behind (NCLB) has narrowed curriculum in terms of other subjects, such as science and social studies receiving less attention in classrooms, particularly elementary classrooms. (Kingsbury, 2007; McMurrer, 2008; as cited in Judson, 2013, p. 623)

Holt (2002) wrote that "narrowing of curriculum sucks all love of learning out of education while creating a focus on reading, writing, and math to the exclusion of everything else" (p. 266). This narrowing occurred as it was seen as favorable to master standards with "conveyor-belt precision" (Holt, 2002, p. 265). Between 2006 and 2007, the Center on Education Policy (2008) conducted a study of 349 school districts to examine the amount of instructional time allocated to specific subjects and found that since the enactment of No Child Left Behind in 2002, "62% of all school districts had increased the amount of time in elementary schools on language arts and/or math, while 44% did so while also cutting time for science, social studies, art, music, and physical education, lunch or recess" (p. 23). Ultimately researchers found that since NCLB took effect schools decreased non-tested subjects and activities by an average of 75 minutes a week or more (Center on Education Policy, 2008).

Research by the National Research Council (2011) supported amending current federal law to include science in their annual accountability indicators to reinforce the need for science

education in K-12 schools. At the time of their report, 12 states had indicated science as an accountability indicator (NRC, 2011). Blank (2013) reported that an analysis of 150 earlier studies indicated that students' general interest in science content began to decline starting at age 11. During the 2007-2008 school year, science was allocated an average of 2.3 hours per week of instruction, compared to an average 11.7 hours for reading/language arts, 5.6 hours for mathematics, and 2.3 hours for social studies in grades 1-4, representing a steady decline since 1988. When comparing these allocations to the fourth grade NAEP achievement data, Blank (2013) observed a four-point difference between states with an average of two hours allocated to science instruction versus states with an average of three and a half hours allocated to science instruction, four points being statistically significant. A difference of 12 points was observed between states allocating less than one hour of science instruction versus states allocating over 4 hours of weekly instruction in science (Blank, 2013). Blank (2013) also noted in their research that the additional time allocation did not close the achievement gap between high- and low-income status students. Several studies reported that schools have allocated less instructional time to science and social studies since the inception of NCLB (Kingsbury, 2007; Linn, 2008; McMurrer, 2008; as cited in Judson, 2013). In a study that reached all 50 states, 71% of school districts reported reducing the amount of time in other subject areas to allow for increases to instruction in reading and mathematics as achievement in those subject areas were used in accountability measures (Chudowsky et al., 2006 as cited in Judson, 2013). However, Judson (2013) warned that if achievement in other content areas becomes over regulated then a fear of penalties may not have overall positive effects on student interest and learning.

Prior to the enactment of NCLB in 2002, schools reported allocating an average of 378 minutes per week on English language arts, whereas by 2007 districts reported allocating an average of 520 minutes on the same subject matter, an increase of 47% (Center on Education Policy, 2008). When examining changes to allocations for mathematics instruction researchers noted similar trends, with 75% of reporting districts adding 50-150 minutes per week of additional instructional time (Center on Education Policy, 2008).

In 2003, after the enactment of NCLB, the Head Start early childhood program was reauthorized. In the reauthorization, language relating to social and emotional development was replaced by literacy (Alford et al., 2016). Alford et al. (2016) conducted a study with the purpose of identifying the amount of time and opportunities students had to engage in student-centered versus teacher-centered instructional activities amongst primary age students (preschool to grade two). Alford et al's (2016) research also found that kindergarteners were spending considerably more time on academic content than in free-exploration opportunities. The study by Alford et al. (2016) analyzed 91 primary aged classrooms to observe the amount of time spent on various types of learning activities, as well as student and teacher actions and behaviors during these activities. Throughout their observations, the researchers found that students spent approximately 43% of their time either participating in listening/watching activities or on written assignments (Alford et al., 2016). These two activities made up 65% of the activities observed throughout all observations (Alford et al., 2016). Student-centered activities were observed for less than 10% of the total instructional time, with constructive play being observed less than one percent of the time. Whole group direct instruction was also observed to be utilized over 55% of all instructional time (Alford et al., 2016). Ultimately Alford et al's (2016) findings showed that

classrooms where higher percentages of time were allocated to developmentally appropriate instructional practices had higher engagement rates than classrooms where other instructional practices were utilized.

Research regarding reading and socio-economic classes found that first graders from lower socio-economic status (SES) classrooms spent almost 40% of their time with text at the letter or word level, whereas their higher-SES counterparts spent nearly 50% of their time with connected texts (McIntyre et al., n.d.). Other researchers found that time spent silent reading had an impact on older students in grades five and six, while showing little correlation for primary aged learners (Frye et al., 1990). Therefore McIntyre (n.d.) suggested that it is important for young learners to have reading time monitored closely by a teacher, rather than focusing on independent reading tasks. In their study, they observed 26 first-grade classrooms in 10 schools and found that of the lowest performing 20% of each class, students who spent 40% or more of their time reading connected text, and students who spent 20% or less of their time reading connected text had no significant difference in reading achievement (McIntyre et al, n.d.). The researchers argue that at this stage of development students need more time engaged with their classroom teacher to build necessary reading skills, so it is more about how their time is spent, rather than how much they are reading, especially for struggling readers (McIntyre et al, n.d). McIntyre et al. (n.d.) went on to assert that allocating time to independent reading when students cannot read much is not a beneficial instructional activity for improving reading outcomes. Instead, they suggest that these times, especially for young learners, needs to be closely monitored for student engagement (McIntyre et al, n.d.). These researchers also support the finding that there are a variety of learning activities that students should engage in throughout

their school day to build strong reading skills, further supporting the concept that how the allocated time is utilized may have a greater impact then just how much total time students spend in school.

Karweit (1984) stated that the National Commission on Excellence in Education considered promoting policies that would lengthen the school year to 220 days consisting of 7-hours of instruction and other activities (p. 33). Considering these recommendations for policy enaction, Karweit made the following statement:

> Time is a necessary, but not sufficient, condition for learning. Learning takes time but providing time does not in itself ensure that learning will take place. Many of the studies find a statistically significant effect of engaged time on learning. Academic learning time becomes a measure both of how much time was spent and how appropriately it was used. (Karweit, 1984, p. 33)

Several researchers refer to the prior investigations by Carroll (1963), where they expressed that learning was a function of time spent and time needed (Karweit, 1984). Research since then has often focused on the amount of time spent, while all but ignoring the amount of time needed (Karweit, 1984). Gettinger (1985; 1989) built from Carroll's construct that deepening the understanding of time needed for learning could greatly impact how time is both allocated and utilized in elementary schools. Their research focused on three variables a) time allocated for learning, b) time spent on learning, and c) time needed for learning (Gettinger, 1985). Gettinger (1985) explained that individual differences amongst students was one of the most understood and accepted generalizations in education, therefore allocating or spending additional instructional time on a task may not benefit all students to the same extent. The goal of

Gettinger's (1985) research was to determine the average amount of time needed to achieve mastery, which was determined to be 100% accuracy, when given multiple attempts on a standardized reading task. Their study was conducted with 171 fourth- and fifth-grade students from four public elementary schools in the Midwest which found that the average student needed approximately four attempts to reach 100% accuracy on a task (Gettinger, 1985). When students were allowed to self-select the number of attempts, it was found that they only spent 68% of the time needed to reach mastery which resulted in a decreased degree of learning (Gettinger, 1985). These findings highlight the importance of both allocating adequate time for learning and ensuring that students engage in learning for as long as they need to maximize their achievement (Gettinger, 1985).

Gettinger replicated their previous study in 1989, this time with third-grade students from Wisconsin, all of whom had been identified with a learning disability. During a time when other research around perseverance was being conducted, they stated that "less than optimal instruction and lower than average ability may increase time needed for learning beyond what would otherwise be predicted" (Gettinger, 1989, p. 76). In addition to methods previously implemented, students in this trial series could also earn incentives for spending more time completing attempts where they were either improving or maintaining their level of achievement (Gettinger, 1989). It was found that on average, students required approximately five trials to reach mastery, and nearly half spent more or less than the amount of needed time when incentives were put in place. These findings once again supported Carroll's model that increasing perseverance only benefits students who typically spend less time than needed in learning, and

simply increasing the amount of time spent does not guarantee an increase in learning, especially for students who may not need as much time (Gettinger, 1989).

Berliner (1978) stated that learning is only impactful if a student is engaged in appropriate content which is clearly organized and at a level which the student can understand. When researching mathematics achievement and engagement, researchers concluded that students needed to attain an accuracy level in mathematics of 80% or greater (Berliner, 1978). They also noted that trying to sustain the length of time students engaged with simple content would not have an academic benefit to students (Berliner, 1978). Rosenshine's (1981) study of engaged learning time found that second grade students who were allocated 90 minutes for literacy activities were engaged in these activities approximately 73% of the time, with higher engagement rates (84%) stemming from teacher-led activities, while lower engagement rates (68%) were shown to be connected to independent work activities. Parallel findings were found for fifth grade students who were allocated 110 minutes for literacy activities. Students were engaged an average of 74% of the time, with higher engagement rates (80%) resulting from teacher-led instruction, while lower engagement rates (63%) were shown to be connected to independent work activities (Rosenshine, 1981). With both groups of students, it was noted that approximately one-third of allocated time was spent on teacher-directed activities and two-thirds was spent on independent activities, suggesting that students spent a shorter period of their school day in a highly engaging mode of learning (Rosenshine, 1981). The study also examined the allocation and engagement rates of mathematics instruction for students in grades two and five (Rosenshine, 1981). Second grade students were allocated an average of 35 minutes per day and exhibited an average engagement rate of 71%, whereas fifth grade students were allocated

44 minutes on average per day for mathematics instruction and remained engaged for 74% of the time (Rosenshine, 1981). Similar to the findings related to literacy instruction, students engaged in mathematics activities spent less than 30% of their instructional time in teacher-led activities and over two-thirds of their time was spent on independent work (Rosenshine, 1981).

In addition to core instruction in the subject areas of reading/language arts, mathematics, science, and social studies, elementary students also have instructional time allocated to encore subject matter areas including the visual arts, music, and physical education amongst others. The next section will explore the literature related to how these subject areas impact and influence academic achievement in elementary aged students.

Encore Instruction Time and Practices

While engaging students in academic learning activities is essential to academic growth and achievement, the social-emotional wellbeing of students is also important for overall success in schools.

> With the increase in state-mandated testing across the USA, schools and school districts are considering ways of increasing instructional time for core curricular subjects such as mathematics, science, English, and social studies. One seemingly logical approach to improving test scores is to reduce the time spent in subjects that are not tested, most notably art, music, and physical education, thus increasing time for tested subjects. (Fraser et.al., 2003, p. 721)

Rosenshine (1981) found that approximately 23 to 24 percent of the school day was allocated to encore subject matter including the visual arts, music, and physical education which accounted for roughly 55 minutes per day for second-grade students and approximately 65

minutes per day for fifth-grade students. After the passage of NCLB schools reported decreasing instruction in art, music, and physical education by nearly 30% to allow additional time for core instruction (Center on Education Policy, 2008). Brenner and May (2016) stated that high-stakes testing have been a result of educational policy. Over more than a decade of testing has not shown a significant increase in student achievement at either the state or national levels, although it has shown a negative impact on arts education across the country (Brenner & May, 2016). Brenner and May (2016) found that following the enactment of NCLB, drastic budget cuts and influences of standardized testing has led to decreases in music education participation. They also examined the effects of music instruction on early literacy skills such as phonemic awareness and reading development (Brenner & May, 2016). First grade teachers reported during the study that student achievement in reading was at the highest levels they had seen in years (Brenner & May, 2016). Researchers concluded that the music instruction that students received helped to foster a love of learning and build skills to serve them throughout their life while engaging in an activity they highly enjoyed (Brenner & May, 2016).

Students also engage in a variety of physical activity opportunities throughout their school day. These opportunities arise in the form of informal recess opportunities as well as formal instruction periods within physical education settings. With the pressures of high stakes testing and student achievement looming, Finnan et al. (2015) found that some school administrators have scrutinized time taken away from core instruction, primarily in reading and mathematics. Finnan et al's (2015) study occurred in an elementary school where 93% of students received free or reduced lunch and 94% of students identified as African American. Observations were conducted in classrooms of second-, third-, and fourth graders over a period

of four years (Finnan et al., 2015). The school allocated 90 minutes to reading/language arts instruction and 60 minutes to mathematics instruction daily (Finnan et al., 2015). The study involved instructing students in yoga methods and practices during weekly lessons which took place during the school day. Students who participated in the yoga instruction showed evidence of increased focus and concentration. They also showed increased perseverance and developed skills associated with positive relationships (Finnan et al., 2015). Over 73% of teachers whose classes participated in the program reported carryover of skills into the academic setting, which led to increased engagement in learning (Finnan et al., 2015). The school also observed a reduction in disciplinary referrals by 50% with the trend staying steady in ensuing years (Finnan et al., 2015).

A study by Hunt et al. (2010) was conducted in a first grade setting to analyze the impact of a 15-minute recess break on the spelling and writing productivity as well as reading comprehension of students. The need for this study arose as several schools had begun to eliminate recess to allow for more time to engage in instruction of tested subjects, although recent studies had suggested that spending more time on a task would not guarantee an increase in achievement (Hunt et al., 2010). The Peabody Picture Vocabulary Test (PPVT-IIIA) was administered to 32 students in the school to determine their language ability (Hunt et al., 2010). The study found that students who received a recess break prior to their reading and language lessons performed at higher levels of academic achievement, than their peers who received a recess break after instruction had taken place (Hunt et al., 2010). Prior studies, which were cited by the researchers, stated that play had been shown to enhance cognitive development as it provides the brain with opportunities to create chemicals that support the development of long-

term memory, which is crucial to learning (Hunt et al., 2010). However, the authors of the study also stated that there is a need for action research to investigate how recess breaks can affect student's attention and achievement (Hunt et al., 2010).

A study by Fraser et al. (2003) surveyed 547 elementary school principals in Virginia to collect data related to the number of specialists each school had for encore subjects, including: art, music, and physical education. They also collected data related to the amount of instructional time spent on subject matter in these three areas and investigated the relationship and correlation to student achievement (Fraser et al., 2003). Researchers sent surveys to 1,167 elementary principals and received responses from 547 principals (Fraser et al., 2003). Student achievement data was obtained from the Virginia Department of Education's website for grades three and five during the 1999-2000 school year in all four core academic areas (Fraser et.al., 2003). Researchers averaged out the responses of time allocation to find that most students spent 49 minutes per week with an art specialist, 59 minutes with a music specialist, and 82 minutes with a physical education specialist (Fraser et.al., 2003). Fraser et al. (2003) concluded that there would be no increase in student achievement by decreasing the amount of encore instruction time spent in elementary schools. They also stated that overall, the relationship between achievement and encore instruction time was "statistically null", while they also stated that the trend was positive and could potentially mean that more encore instruction time could lead to higher test scores (Fraser et.al., 2003, p. 731).

Summary

The review of literature encompassed many ideas and findings that spanned multiple decades and cross regional boundaries. Research related to the amount of time elementary aged students spent in school varied around the world as well as around the United States. A simple comparison of PISA and NAEP achievement data with policies related to time in school left researchers wondering how they correlate statistically. They also left educational practitioners wondering if they were utilizing time resources to the best of their ability.

The United States underwent significant educational reforms in the past twenty years with the passage, adoption, and implementation of No Child Left Behind, and the reauthorization under the Every Student Succeeds Act which maintained high stakes testing mandates. Districts have seen shifts in how time is being allocated to core subjects such as reading/language arts, mathematics, science, and social studies, as well as encore subjects such as arts, music, and physical education with varying impacts on student achievement. The following study was focused on observing the correlation between time allocated to instruction in both core and encore subject matter and current levels of achievement in Minnesota public elementary schools to gain a better understanding of current impacts of time allocations.

Chapter 3: Methodology

This quantitative study was designed to examine the extent to which the amount of instructional time allocated to reading/language Arts, mathematics, science, social studies, art, music, and physical education shared a relationship with student achievement in reading and mathematics as measured by the Minnesota Comprehensive Assessments (MCA) for grades three through five in public elementary schools across the state of Minnesota.

Chapter three provided information specific to this quantitative study design and methodology, including: research questions and hypotheses, research design, variables, study population and sampling, data collection, treatment of the data, and human subject approval via the Institutional Review Board.

Statement of the Problem

The review of literature revealed that there was limited research exploring the relationship between the amount of time allocated to instruction and student achievement at the elementary level. While the related literature and data indicated a narrowing of curriculum across public schools throughout the United States, the research did not examine the impacts of instructional time reallocations in multiple subject areas on student achievement, including those which were not formally assessed by state measures.

Purpose of the Study

This study examined the extent to which there is a relationship between time allocated to instruction in the subject areas of reading/language arts, mathematics, science, social studies, art, music, and physical education and student achievement in reading and mathematics for grades three through five across Minnesota's public elementary schools. This study also examined to

what extent time is allocated to instruction in multiple subject areas which are not formally assessed to determine if there appeared to be any impacts on student achievement. The related literature indicated that over the past two decades, instructional time for non-tested subjects has been reduced to allow for instructional time to be increased for the tested subjects of reading and math. As social studies, art, music, and physical education are non-tested subjects, this study aimed to investigate the relationship that instruction in these subjects had to student achievement. The relationship between science instruction and student achievement was also investigated along with other non-tested subjects as science was originally a non-tested subject.

Research Questions and Hypothesis

The following questions were used to guide the investigation of the relationship between time allocated to instruction and student achievement across public elementary schools in Minnesota.

1. To what extent was time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five across select Minnesota public elementary schools during the 2018-2019 school year?
2. To what extent was there a relationship between time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five during the 2018-2019 school year and student achievement as measured by the 2019 Minnesota Comprehensive Assessments in Reading and Math across select Minnesota public elementary schools?
    a. Alternative Hypothesis: There was a significant relationship between the amount of time allocated to instruction in Reading/Language Arts, Math, Science, Social

Studies, Art, Music, and Physical Education for grades three through five and student achievement as measured by the Minnesota Comprehensive Assessments in Reading and Math.

b. Null Hypothesis: There was no significant relationship between the amount of time allocated to instruction in Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five and student achievement as measured by the Minnesota Comprehensive Assessments in Reading and Math.

Research Design and Methodology

The quantitative study design investigated the average amount of time allocated to instruction across multiple subject areas in select Minnesota elementary schools, as well as the correlations between the amount of time allocated to instruction and student achievement.

The study design approach used was an experimental design referred to as causal-comparative research. Creswell and Guetterman (2019) stated that an experiment is used to test an idea or practice to determine whether there was an influence on the outcome. The study described in this chapter investigated whether there was a relationship between the amount of time allocated to instruction in seven subject areas: reading/language arts, mathematics, science, social studies, art, music, and physical education, and the impacts on student achievement in two subject areas: reading and math. This study served as an initial investigation and analysis of variables which have not been purposefully correlated in previous research studies. Using a causal-comparative design involved comparing two groups that differed in some way, such as instructional time and achievement (Creswell & Guetterman, 2019). Causal-comparative designs

do not involve the manipulation of variables as there are often conditions in educational settings that cannot be easily altered, such as the curriculum being used in two classrooms (Creswell & Guetterman, 2019).

The study utilized secondary data collected by and reported by the Minnesota Department of Education for the 2018-2019 school year. McMillan and Schumacher (2010) described this type of research as ex post facto research as the conditions already occurred. Creswell and Guetterman (2019) cautioned that findings of causal-comparative research studies must be carefully interpreted as there is less control over other outside variables. They also caution that causal-comparative designs are not used to identify cause and effect relationships between variables, but rather associations between variables (Creswell & Guetterman, 2019).

The remainder of this section of the research design described the variables identified for study, discuss cross-sectional data, treatment of the data, as well as assumptions regarding validity and reliability of the data collected for analysis, and data security.

Variables

This study included both independent and dependent variables for data collection and analysis. An independent variable may "impact or predict the dependent variable" (Bergin, 2018, p. 73). A dependent variable represents an outcome (Bergin, 2018). The independent variables for this study included the time allocation data for each of seven subject matter areas including: reading/language arts, mathematics, science, social studies, art, music, and physical education. These have been identified as independent variables as the researcher examined the extent to which there is a difference in the amount of time that was allocated in each subject area across grade levels and examine the correlation that each subject area has to student achievement in

reading and math. Therefore, the dependent variable for this study was student achievement in reading and math as measured by the Minnesota Comprehensive Assessments for reading and math.

Population and Sampling

The population used in this study included all public elementary schools in Minnesota. Bergin (2018) stated that it is typically impractical to gather data related to an entire population, therefore the use of sampling is needed to identify a portion of the population that can be accessed for study. Deliberate sampling was used in this study so that only public non-charter elementary schools which included kindergarten through fifth grade in their configuration were included in the data, as most schools in Minnesota utilized either a K-5 or K-6 configuration. Deliberate sampling involves intentionally choosing participants that "exhibit particular characteristics" (Bergin, 2018). Charter schools, Bureau of Indian Education (BIE) schools, and private schools were excluded from the study sample as these schools may have followed different requirements in terms of instructional programming and assessment than traditional public schools. The sample for this study included only public non-charter elementary schools which have the six consecutive grade levels beginning with kindergarten and ending with fifth grade. Instructional time allocation data was collected to measure the average amount of time allocated to subject matter instruction across grade levels.

Data Collection

Data was collected from the Minnesota Department of Education's (MDE) Data Center through their public data request system. Data was collected for the 2018-2019 school year and included: time allocations (minutes of instruction) for each of seven academic areas

(reading/language arts, mathematics, science, social studies, art, music, and physical education) in each of grade three through five, along with proficiency data from the Minnesota Comprehensive Assessment (MCA) in reading and mathematics in grades three through five. The data was assumed to be valid as time allocations were self-reported by school districts directly to the state education authority. The raw data from the Minnesota Department of Education on time allocations and achievement scores was organized into Excel spreadsheets by MDE's Data Center staff. The researcher then reorganized the data based on the deliberate sampling techniques necessary to achieve the purpose of the research study. Reorganization included removing data for subject matter outside those being measured in the study and removing schools which do not meet the deliberate sample which included inclusion of grades K-5 in their configuration and reporting time for each subject area identified in the research questions. Once the data set was organized based on the sampling, the raw data was treated by the Statistical Consulting and Research Center at St. Cloud State University utilizing the treatments outlined in the following sections.

Validity of the data. Minnesota school districts reported the total minutes of instruction per term based on course content directly to the Minnesota Department of Education. The researcher assumed that the data collected for this study was valid as it was compiled by the Data Center at the Minnesota Department of Education. Bergin (2018) described possible disadvantages with utilizing secondary data which may include: missing variables, slightly varying definitions of concepts, and potentially missing data. The Minnesota Department of Education did not run any validity testing on this data; therefore, the researcher assumed that districts accurately reported the minutes of instruction. To account for any missing data, the

sample only included schools who reported minutes of instruction for all seven identified subject areas across each grade level. To account for possible errors in data entry, the sample only included schools which reported between 4,000 and 25,000 minutes of instruction for reading/language arts and mathematics, and a total below 75,000 minutes to account for the length of a standard school day being between six and seven hours in length.

Reliability of the data. Minnesota school districts reported the total minutes of instruction per term based on course content directly to the Minnesota Department of Education. The researcher assumed that the data collected for this study was reliable as it was compiled by the Data Center at the Minnesota Department of Education. There was no reliability testing utilized in this study as there are no data collection instruments being used, such as surveys or questionnaires (Creswell & Guetterman, 2019). Also, the Minnesota Department of Education did not conduct any reliability testing related to this data collection. Therefore, the researcher assumed that school districts accurately reported their annual minutes of instruction in each identified subject area.

Data security and protections. Bergin (2018) stressed the importance of research ethics and protecting and preserving the data related to this study. The data for this study will be housed in excel spreadsheets which will originate from the Minnesota Department of Education's Data Center. The spreadsheets were stored in the one-drive cloud storage system of St. Cloud State University and accessed on a password protected computer.

Cross-Sectional Data

This study utilized secondary data collected through a public data request from the Minnesota Department of Education's Data Center. Secondary data was defined as data which has been "collected by other researchers" (Bergin, 2018, p. 51). The information which will be collected will include data related to the amount of time (in days and minutes) allocated by each elementary school in the sample to instruction in the seven identified subject areas as well as student achievement data from the Minnesota Comprehensive Assessments in reading and math. In addition, the data set included the number of annual instructional days. The data for instructional time, and student achievement were from the 2018-2019 school year as the researcher understands that instructional time was greatly impacted during the 2020 and 2021 school years as schools in Minnesota needed to shift to alternative learning models due to the COVID-19 pandemic. Since this study focuses specifically on collecting related data from one school year, this study will be utilizing cross-sectional data. According to Bergin (2018) cross-sectional data were "focused on a particular moment in time" (p. 70). This will be an initial study of these variables and so the researcher will discuss recommendations for further research in chapter five which will include a replication of this study utilizing longitudinal data which investigates the same group over different periods in time (Bergin, 2018).

Treatment of the Data

To analyze the data, the following treatments were used to address each of the related research questions. This study utilized multiple treatments including descriptive statistics, correlation testing, and significance testing. The researcher utilized the services of the Statistical

Consulting and Research Center (SCRC) at St. Cloud State University to conduct the following treatments and help generate applicable information tables.

Descriptive Statistics

Research question one investigated the extent to which that instructional time is allocated across multiple subject areas including reading/language arts, mathematics, science, social studies, art, music, and physical education in elementary schools across Minnesota. This data was reported utilizing a variety of statistical measurements under the umbrella of descriptive statistics. Bergin (2018) describes descriptive statistics as being able to identify the average values of a sample and detect variations between different data points. The following measures were used to describe the data used in this study.

Measures of Central Tendency. This study utilized multiple measures which "give a value for the 'centre' of a particular set of data" (Bergin, 2018, p. 77). These measures included mean and range. The mean locates the average of the set of data and is "calculated by adding all the different data points in a sample and dividing that total by the number of data points in the sample" (Begin, 2018, p. 77).

Measures of Variability. This study also utilized measures which analyzed the "spread or variability" of the data to investigate the relationship with the measures of central tendency (Bergin, 2018, p. 79). These measures included range. The range is the "difference between the highest value and lowest value in a dataset" (Bergin, 2018, p. 79).

Correlation: Pearson *r*

Research question two investigated the relationship otherwise referred to as the correlation between the independent variables, which include the amount of time allocated to

instruction for each of seven subject matter areas (reading/language arts, mathematics, science, social studies, art, music, and physical education) and the dependent variable which is student achievement as measured by the Minnesota Comprehensive Assessments in reading and math. Therefore, the Pearson product-moment coefficient correlation test, otherwise known as the Pearson *r*, was used to measure the extent to which there is a relationship between the independent and dependent variables (McMillan & Schumacher, 2010). The Pearson *r* was used to report the effect size of predictors, otherwise known as independent variables (Creswell & Guetterman, 2019). Effect sizes are reported with values which range from -1.00 to +1.00, with values closer to +1.00 showing strong positive correlations between predictor (independent) variables and outcomes (dependent variables) (Creswell & Guetterman, 2019). According to Cohen's index (1988) an effect size of 0.2, 0.5, and 0.8 would be regarded as a small, medium, and large effect respectively (as cited in McMillan & Schumacher, 2010).

Significance and Probability Level

Creswell and Guetterman (2019) stated that "a significance (or alpha level) is a probability level that reflects the maximum risk you are willing to take that any observed differences are due to chance" (p. 188). The alpha level used for this study was 0.05, which suggested that there will be a 95% probability level (p-value) needed to support the researcher's hypotheses and reject the null hypotheses. According to Bergin (2018), the p-value indicates the "likelihood that we would obtain results equivalent to, or more extreme than, the results we actually see in our data, if the null hypothesis were true" (p. 83). A p-value reaching below 95% would have indicated that the null hypothesis is more accurate based on the findings of this study.

Human Subject Approval-Institutional Review Board (IRB)

Data for this study was obtained through a public data request through the Minnesota Department of Education's Data Center. Therefore, no individuals' data will be collected or identifiable. There will be no human participants in this study. The IRB application was submitted on June 25th, 2021, after the preliminary examination of this research proposal and approved under an exempt review on July 12th, 2021.

Summary

Chapter three outlined the research design and methodology that was used to examine the relationship between time allocated to instruction and student achievement in public elementary schools in Minnesota. This included the research questions and hypotheses, research design, treatment of the data, study population and sampling, data collection, and treatments for data analysis. Chapter four discussed the results of this study design.

Chapter 4: Results

The structure of the elementary school day has been guided by national legislation such as the No Child Left Behind Act of 2002, and the reauthorization as the, Every Student Succeeds Act of 2015 (Center on Education Policy, 2008; Association for Supervision and Curriculum Development, 2015). The structure of instructional expectations has also been guided in Minnesota through legislation such as the Read Well by 3rd Grade statute (Minn. Stat. § 120B.12, 2001) and the World's Best Workforce statute (Minn. Stat. § 120B.11, 2013). Multiple studies have reported findings which suggested that instructional time had been narrowed to focus on specific tested subjects following legislation over the last 20 years which put a focus on increasing student achievement in reading and mathematics (Center on Education Policy, 2008; Judson, 2013).

Knowing that policies had influenced the amount of time students had access to instruction in several subject areas, this study set out to investigate the relationship, if any, between the amount of time allocated to instruction in tested and non-tested subjects including reading/language arts, mathematics, science, social studies, art, music, and physical education and student achievement in both reading and mathematics in Minnesota during the 2018-2019 school year.

This chapter reports the raw findings of the study. Quantitative data describes the average amount of time which was reportedly allocated for each subject area: reading/language arts, mathematics, science, social studies, art, music, and physical education, as well as the correlations between the amount of time allocated to instruction and student achievement in both reading and mathematics amongst select schools in grades three through five in Minnesota.

Chapter four will review the purpose of the study and research methodology, explain the study population and sampling techniques used, and report the findings related to each research question.

Statement of the Problem

The review of literature revealed that there was limited research exploring the relationship between the amount of time allocated to instruction and student achievement at the elementary level. While the related literature and data indicated a narrowing of curriculum across public schools throughout the United States, the research did not examine the impacts of instructional time reallocations in multiple subject areas on student achievement, including those which were not formally assessed by state measures.

Purpose of the Study

This study examined the extent to which there is a relationship between time allocated to instruction in the subject areas of reading/language arts, mathematics, science, social studies, art, music, and physical education and student achievement in reading and mathematics for grades three through five across Minnesota's public elementary schools. This study also examined to what extent time is allocated to instruction in multiple subject areas which are not formally assessed to determine if there appeared to be any impacts on student achievement. The related literature indicated that over the past two decades, instructional time for non-tested subjects has been reduced to allow for instructional time to be increased for the tested subjects of reading and math. As social studies, art, music, and physical education are non-tested subjects, this study aimed to investigate the relationship that instruction in these subjects had to student achievement.

The relationship between science instruction and student achievement was also investigated along with other non-tested subjects as science was originally a non-tested subject.

Research Methodology

This study collected existing data from the Minnesota Department of Education through a public data request. This data set included reported time allocations for each of seven subject areas: reading/language arts, mathematics, science, social studies, art, music, and physical education for grades three through five at K-5 and K-6 public elementary schools. The data set also included student achievement data reported as a percentage of tested students scoring as proficient on the Minnesota Comprehensive Assessments in reading and mathematics. The data used in this study was from the 2018-2019 school year as this was the last year which was not impacted by the COVID-19 pandemic which greatly impacted policies related to learning models and standardized testing in Minnesota.

The first research question asked: *To what extent was time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five across select Minnesota public elementary schools during the 2018-2019 school year?* This question focused on reporting the average amounts of time allocated to instruction in grades three through five using descriptive statistical measures. These measures included mean and range to describe the average amount of time allocated to instruction in each subject as well as the spread of the data collected.

The second research question asked: *To what extent was there a relationship between time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five during the 2018-2019 school year*

and student achievement as measured by the 2019 Minnesota Comprehensive Assessments in Reading and Math across select Minnesota public elementary schools? This question focused on analyzing the relational strength between the amount of time allocated to instruction in each identified subject area and the proficiency levels of students in grades three through five across Minnesota's public elementary schools in both reading and mathematics. The study utilized the Pearson product-moment coefficient correlation test, also known as the Pearson *r*, to measure the correlational strength between each variable, as well as significance testing to determine the likelihood that the observed correlations were not due to chance.

Study Population and Sample

The study utilized deliberate sampling techniques to only include public elementary schools in Minnesota with a K-5 or K-6 configuration. This initial sampling resulted in a study population of 419 schools. Some schools were excluded from the study sample as they did not report time allocation in one or more subject area identified in this study. When looking at the time allocations reported, the researcher also noted some inconsistencies in the annual instructional minutes reported by each school which may not have been valid. This included allocations that drastically underrepresented the amount of time allocated to instruction (as little as 1 minute per day in each subject area) to an overrepresentation of time allocated to instruction, resulting in more minutes being reported than existed in a school day or a school year. Therefore, the researcher determined that schools that reported less than 4,000 annual minutes (approximately 25 minutes per day) or more than 25,000 annual minutes (approximately 150 minutes per day) in either reading/language arts or mathematics would be excluded from the study sample as the related literature had outlined that most of the instructional time was being

allocated to these two subject areas in elementary schools (Center on Education Policy, 2008; Holt, 2002; Judson, 2013).

Schools included in the study sample needed to have reported data for all subject areas: reading/language arts, mathematics, science, social studies, art, music, and physical education for each grade three through five. Out of the original 419 schools in the study population, 68 schools met the sampling criteria to be included in the study sample for analysis including reporting annual minutes of instruction in each identified subject area with an allocation between 4,000 and 25,000 annual minutes of instruction in both reading/language arts and mathematics.

Research Question 1

The first research question examined the amount of time allocated to instruction in reading/language arts, mathematics, science, social studies, art, music, and physical education for grades three through five as reported by public elementary schools in Minnesota. The research question asked was:

> *To what extent was time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five across select Minnesota public elementary schools during the 2018-2019 school year?*

To analyze the extent to which time was allocated to instruction in reading/language arts, math, science, social studies, art, music, and physical education, this study utilized descriptive statistical measures to describe the averages and spread of the data collected. These data points included measures of central tendency such as mean, as well as measures of variance such as range. Mean scores locate the center most values in the data set. The mean identified the average amount of time reportedly allocated to instruction in each subject area. The range described the

difference between the minimum and maximum reported minutes of annual instruction in each subject area (Bergin, 2018). The range helped to identify the spread of the data.

The tables below showed the mean and range of the reported data set in each subject area identified in this study, followed by a narrative describing the analyzed data. These measures aid in identifying the average amounts of time allocated to each subject area across grades three through five in Minnesota's public elementary schools.

Table 3 below outlined the reported mean average of annual minutes of instruction reported for grades three through five during the 2018-2019 school year.

Table 3

Average Yearly Days and Minutes Allocated to Instruction as Reported by Schools: ≈169 Days

n = 68	**Grade 3**	**Grade 4**	**Grade 5**
	Mean	**Mean**	**Mean**
Reading/Language Arts Instruction	14,831	14,841	14,901
Mathematics Instruction	10,281	10,294	10,206
Social Studies Instruction	4,340	4,332	4,340
Science Instruction	4,317	4,310	4,317
Music Instruction	3,371	3,371	3,371
Physical Education Instruction	3,195	3,220	3,220
Art Instruction	2,898	2,898	2,898

There were 68 select elementary schools in Minnesota that reported the total number of annual instructional days for grades three through five during the 2018-2019 school year. The mean (average) was approximately 169 days of instruction during the school year. Average time allocations for instruction remained relatively steady across grades three through five. The mean (average) for reading/language arts was calculated by combining the 35 school sites who reported time for language arts instruction with 33 school sites who reported time for reading instruction across grades three through five. As Minnesota has established English Language Arts standards which include reading instruction, language arts and reading were related subject matter and therefore reported as such in the findings of this study.

As Table 3 above showed, the mean (average) time allocation reported by schools was approximately 14,857 minutes across all three grade levels for reading/language arts instruction during the 2018-2019 school year. There were approximately 10,260 annual minutes of instruction reportedly allocated to mathematics instruction. Schools reported similar average amounts of instructional time for both social studies and science instruction with a mean of 4,337 and 4,315 annual minutes of instruction respectively reported. Fine arts instruction which included both music and art instruction remained steady across grades three through five with a reported mean (average) of 3,371 minutes of instruction reported for music instruction and 2,989 minutes of instruction reported for art instruction during the 2018-2019 school year. Finally, an average of 3,212 annual minutes of instruction were reported for physical education instruction.

Table 4 below outlined the reported range of annual minutes of instruction reported for grades three through five during the 2018-2019 school year.

Table 4

Range of Yearly Minutes Allocated to Instruction as Reported by Schools: ≈169 Days

n = 68	Grade 3		Grade 4		Grade 5	
	Min	**Max**	**Min**	**Max**	**Min**	**Max**
Reading/Language Arts Instruction	4,260	22,960	4,260	22,960	4,260	22,960
Mathematics Instruction	4,260	19,665	4,260	20,520	4,260	14,535
Social Studies Instruction	1,350	10,200	1,350	10,200	1,350	10,200
Science Instruction	1,350	10,200	1,350	10,200	1,350	10,200
Music Instruction	1,881	10,200	1,881	10,200	1,881	10,200
Physical Education Instruction	1,650	10,200	1,650	10,200	1,650	10,200
Art Instruction	1,026	10,200	1,026	10,200	1,026	10,200

There were 68 elementary schools in Minnesota that reported the total number of annual instructional days for grades three through five during the 2018-2019 school year. The range (difference between the maximum and minimum time allocations) was 32 days of instruction between the highest allocation (174 days) and the lowest allocation (142 days). The range for reading/language arts was calculated by combining the 35 school sites who reported time for language arts instruction with 33 school sites who reported time for reading instruction across grades three through five. As Minnesota has established English Language Arts standards which include reading instruction, language arts and reading were related subject matter and therefore reported as such in the findings of this study.

As Table 4 above showed, the range (difference between the maximum and minimum time allocations) was 18,700 annual minutes of instruction in reading and language arts between the highest allocation (22,960 minutes) and the lowest allocation (4,260 minutes) across grades three through five.

The range of time allocations varied across grade levels for mathematics instruction with grade three reporting a range of 15,405 annual minutes between the highest allocation (19,665 minutes) and the lowest allocation (4,260 minutes), grade four reporting a range of 16,260 annual minutes between the highest allocation (20,520 minutes) and the lowest allocation (4,260 minutes), and grade five reporting a range of 10,275 annual minutes between the highest allocation (14,535 minutes) and the lowest allocation (4,260 minutes). It was noted that only one school site reported each of the maximum time allocations across grades three through five, with the next highest time allocation being reported at 13,120 annual minutes of mathematics instruction.

The range of time allocated to social studies and science instruction was the same with a reported range of 8,850 annual minutes between the highest allocation (10,200 minutes) and the lowest allocation (1,350 minutes). It was noted that six school sites reported each of the maximum time allocations across grades three through five, with the next highest time allocation being reported at 7,560 annual minutes of social studies and science instruction.

The range of time allocated to music instruction was 8,319 annual minutes between the highest allocation (10,200 minutes) and the lowest allocation (1,881 minutes). It was noted that only two school sites reported the maximum time allocations across grades three through five, with the next highest time allocation reported at 7,560 annual minutes of music instruction.

The range of time allocated to physical education instruction was 8,550 annual minutes between the highest allocation (10,200 minutes) and the lowest allocation (1,650 minutes). It was noted that only one or two school sites reporting the maximum time allocation across all three grade levels. Each grade level reported their next highest time allocation as 8,500 minutes in grade three and 7,560 minutes in grades four and five.

Finally, the range of time allocated to art instruction was 9,174 annual minutes between the highest allocation (10,200 minutes) and the lowest allocation (1,026 minutes). It was noted that only two school sites reported the maximum time allocations, with the next highest time allocation reported as 7,560 minutes of instruction across all three grade levels.

The next section describes the results and findings related to the second research question used to guide this study in grades three through five during the 2018-2019 school year.

Research Question 2

The second research question examined the correlations between the amount of time allocated to instruction in reading/language arts, mathematics, science, social studies, art, music, and physical education for grades three through five and student achievement in reading and mathematics as reported by public elementary schools in Minnesota. The research question asked was:

> *To what extent was there a relationship between time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five during the 2018-2019 school year and student achievement as measured by the 2019 Minnesota Comprehensive Assessments in Reading and Math across select Minnesota public elementary schools?*

To analyze the relationship between the amount of time allocated to instruction in reading/language arts, math, science, social studies, art, music, and physical education and student achievement in reading and math for students in grades three through five, this study utilized correlation testing to measure the strength of any relationships between the variables of instructional time and achievement. The measurements utilized were the Pearson product-moment coefficient (Pearson *r*) correlation test and significance testing. The Pearson *r* reports the effect size of independent variables, represented by time allocated to instruction in this study (Creswell & Guetterman, 2019). These effect sizes are reported on a range from -1.00 to 1.00, where 1.00 suggests a strong positive correlation between the variables (Creswell & Guetterman, 2019). Cohen's index (1988) suggests that an effect size of 0.2, 0.5, and 0.8 indicates a small, medium, and large effect (as cited in McMillan & Schumacher, 2010). Significance testing is used to identify whether the results of the analysis are in line with the study's hypothesis or null hypothesis (Bergin, 2018). A significance level of 0.00-0.05 would indicate that the data is significant and support the study's hypothesis. Significance levels larger than 0.05 would indicate a low significance and support the study's null hypothesis.

The table below displayed the effect size as measured by the Pearson *r* correlation test as well as the significance level for each subject area and student achievement area, followed by a narrative describing the data. The data set included instructional time data and student achievement data from grades three through five at 68 public elementary schools in Minnesota during the 2018-2019 school year.

Table 5 below outlined the relationships between the annual minutes allocated to reading/language arts instruction and reported MCA proficiency levels in both reading and mathematics across grades three through five during the 2018-2019 school year.

Table 5

Correlation Between Reported Yearly Minutes of Instruction and MCA Proficiency Levels in Reading and Mathematics

n = 68	**Reading Achievement**		**Mathematics Achievement**	
	Effect Size	**Sig. (2-Tailed)**	**Effect Size**	**Sig. (2-Tailed)**
Physical Education Instruction	0.64	***0.00**	0.59	***0.00**
Reading/Language Arts Instruction	0.26	***0.03**	0.29	***0.02**
Mathematics Instruction	0.07	0.57	0.04	0.73
Art Instruction	-0.06	0.65	-0.06	0.63
Music Instruction	-0.28	***0.02**	-0.27	***0.03**
Science Instruction	-0.59	***0.00**	-0.58	***0.00**
Social Studies Instruction	-0.59	***0.00**	-0.58	***0.00**

*P < .05

Each of the 68 elementary schools reported time allocations for instruction in reading and language arts for grades three through five during the 2018-2019 school year. Each school's achievement level, as measured by the Minnesota Comprehensive Assessments in reading and math, was compared with the annual minutes of instruction which were allocated to reading and language arts instruction to measure the relationship between the variables.

As shown in Table 5, the effect size of the correlation between physical education instruction and reading achievement was 0.64, with a significance level of 0.00. This suggested that there was a medium positive relationship between the amount of time allocated to physical education instruction and reading achievement, which was highly significant at the 0.05 probability level. The effect size of the correlation between physical education instruction and mathematics achievement was 0.59, with a significance level of 0.00. This also suggested that there was a medium positive relationship between the amount of time allocated to physical education instruction and mathematics achievement, which was highly significant at the 0.05 probability level.

The effect size of the correlation between reading/language arts instruction and reading achievement was 0.26, with a significance level of 0.03. This suggested that there was a small positive relationship between the amount of time allocated to reading/language arts instruction and reading achievement, which was significant at the 0.05 probability level. The effect size of the correlation between reading/language arts instruction and mathematics achievement was 0.29, with a significance level of 0.02. This suggested that there was also a small positive relationship between the amount of time allocated to reading/language arts instruction and mathematics achievement, which was significant at the 0.05 probability level.

The effect size of the correlation between mathematics instruction and reading achievement was 0.07, with a significance level of 0.57. This suggested that there was a very weak positive relationship between the amount of time allocated to mathematics instruction and reading achievement, which was not significant at the 0.05 probability level. The effect size of the correlation between mathematics instruction and mathematics achievement was 0.04, with a

significance level of 0.73. This also suggested that there was a very weak positive relationship between the amount of time allocated to mathematics instruction and mathematics achievement, which was not significant at the 0.05 probability level.

The effect size of the correlation between art instruction and reading achievement was -0.06, with a significance level of 0.65. This suggested that there was a very weak negative relationship between the amount of time allocated to art instruction and reading achievement, which was not significant at the 0.05 probability level. The effect size of the correlation between art instruction and mathematics achievement was -0.06, with a significance level of 0.63. This suggested that there was a very weak negative relationship between the amount of time allocated to art instruction and mathematics achievement, which was not significant at the 0.05 probability level.

The effect size of the correlation between music instruction and reading achievement was -0.28, with a significance level of 0.02. This suggested that there was a small negative relationship between the amount of time allocated to music instruction and reading achievement, which was significant at the 0.05 probability level. The effect size of the correlation between music instruction and mathematics achievement was -0.27, with a significance level of 0.03. This also suggested that there was a small negative relationship between the amount of time allocated to music instruction and mathematics achievement, which was significant at the 0.05 probability level.

The effect size of the correlation between science instruction and reading achievement was -0.59, with a significance level of 0.00. This suggested that there was a medium negative relationship between the amount of time allocated to science instruction and reading

achievement, which was highly significant at the 0.05 probability level. The effect size of the correlation between science instruction and mathematics achievement was -0.58, with a significance level of 0.00. This suggested that there was also a medium negative relationship between the amount of time allocated to science instruction and mathematics achievement, which was highly significant at the 0.05 probability level.

The effect size of the correlation between social studies instruction and reading achievement was -0.59, with a significance level of 0.00. This suggested that there was a medium negative relationship between the amount of time allocated to social studies instruction and reading achievement, which was highly significant at the 0.05 probability level. The effect size of the correlation between social studies instruction and mathematics achievement was --0.58, with a significance level of 0.00. This suggested that there was a medium negative relationship between the amount of time allocated to social studies instruction and mathematics achievement, which was highly significant at the 0.05 probability level.

Summary

Chapter four presented the findings and analysis of time allocated to instruction and student achievement across 68 public Minnesota elementary schools. This data analysis included reported annual minutes of instruction allocated to reading/language arts, mathematics, science, social studies, art, music, and physical education and the relationship to both reading and math achievement as measured by the Minnesota Comprehensive Assessments in reading and math. Tables and descriptions were presented to explain the analysis provided. These included the use of descriptive statistics to report the average amount of time allocated to instruction and

correlational data to describe the relationship between instructional time and student achievement.

Chapter five presents the conclusions of the study in the form of discussions of the study results, limitations of the study, and recommendations for the field and future research.

Chapter 5: Discussions, Conclusions, Limitations, and Recommendations

Policy decisions have guided the length and structure of the school day for decades (ECS, 2020; Woods, 2015). As the United States has pushed for increasing student achievement to increase their competitiveness with other OECD nations, implementation of national and state policies has narrowed the curriculum and time allocated to instruction to focus on subject areas which are assessed with standardized tests such as the National Assessment of Educational Progress (NAEP) and the Minnesota Comprehensive Assessments (MCAs) which measure achievement in both reading and mathematics (Center on Education Policy, 2008; Holt, 2002; Judson, 2013).

It was also noted in the literature that most of the previous research had not investigated the relationships between the amount of time allocated to instruction and the apparent impacts on student achievement (Caldwell et al., 1982). Literature from the last decade has continued this trend of investigating the amount of time allocated to instruction, but not the relationship with student achievement (Judson, 2013). Studies which had investigated a relationship between variables and achievement mainly focused on outcomes related to literacy and reading (Gettinger, 1985, 1989; McIntyre et al., n.d.). Therefore, this study sought to investigate the relationships between instructional time and achievement in a variety of common subject areas in Minnesota elementary schools.

Chapter five discusses the findings of this study as presented in chapter four, as well as conclusions that can be drawn from the data. Then presents the limitations related to conducting this study, and finally, presents recommendations for the field and future research.

Statement of the Problem

The review of literature revealed that there was limited research exploring the relationship between the amount of time allocated to instruction and student achievement at the elementary level. While the related literature and data indicated a narrowing of curriculum across public schools throughout the United States, the research did not examine the impacts of instructional time reallocations in multiple subject areas on student achievement, including those which were not formally assessed by state measures.

Purpose of the Study

This study examined the extent to which there is a relationship between time allocated to instruction in the subject areas of reading/language arts, mathematics, science, social studies, art, music, and physical education and student achievement in reading and mathematics for grades three through five across Minnesota's public elementary schools. This study also examined to what extent time is allocated to instruction in multiple subject areas which are not formally assessed to determine if there appeared to be any impacts on student achievement. The related literature indicated that over the past two decades, instructional time for non-tested subjects has been reduced to allow for instructional time to be increased for the tested subjects of reading and math. As social studies, art, music, and physical education are non-tested subjects, this study aimed to investigate the relationship that instruction in these subjects had to student achievement. The relationship between science instruction and student achievement was also investigated along with other non-tested subjects as science was originally a non-tested subject.

Research Questions and Hypothesis

This chapter discussed the findings and conclusions that can be drawn related to the research conducted in this study which was designed to investigate the following questions:

1. To what extent was time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five across select Minnesota public elementary schools during the 2018-2019 school year?
2. To what extent was there a relationship between time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five during the 2018-2019 school year and student achievement as measured by the 2019 Minnesota Comprehensive Assessments in Reading and Math across select Minnesota public elementary schools?
    a. Alternative Hypothesis: There was a significant relationship between the amount of time allocated to instruction in Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five and student achievement as measured by the Minnesota Comprehensive Assessments in Reading and Math.
    b. Null Hypothesis: There was no significant relationship between the amount of time allocated to instruction in Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five and student achievement as measured by the Minnesota Comprehensive Assessments in Reading and Math.

Discussion and Conclusions

This section describes the findings of this study along with conclusions that the researcher has drawn based on the supporting literature.

Research Question 1

The first research question was used to examine the amount of time that select elementary schools in Minnesota allocated to subject matter instruction. It asked:

> *To what extent was time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five across select Minnesota public elementary schools during the 2018-2019 school year?*

The results of the study, as related to this question, were reported using two descriptive measures. This included mean (average) and range (difference between the maximum and minimum time allocations). The findings below are organized by the allocation of time to: instructional days, core subject matter instruction (reading/language arts, mathematics, science, and social studies), and encore subject matter instruction (art, music, and physical education).

Days of instruction. The findings concluded that most elementary schools in this study allocated approximately 169 days to instruction during the 2018-2019 school year, which was above the mandated 165 days of instruction in Minnesota (ECS, 2020). This may have been to account for needed snow days that often occur in Minnesota during the winter months, and therefore not require schools to make-up school days during the summer months. Although there was a large range (32 instructional days), only one school reported the minimum day allocation of 142 days, likely do to being a school that operated on a four-day school week with longer daily hours of instruction. Over 95% of reporting schools fell between 166-172 days of

instruction in their calendars. The average number of instructional days (169) was utilized to calculate and describe the average amount of daily instructional minutes allocated to each subject area below.

Core instruction. This section explores the findings and conclusions that can be drawn based on the average amount of time allocated to core subject matter instruction. These subjects included reading/language arts, mathematics, social studies, and science (Rosenshine, 1981).

Reading/language arts instruction accounted for the largest proportion of the total reported instructional time (≈ 34%), and when the mean (average) of these time allocations (14,858 minutes) was spread over an average of 169 school days, it equated to a daily instructional period of approximately 88 minutes, representing approximately 248 annual hours of instruction in reading/language arts over the course of the year. This average was notably higher than the average found by the Center on Education Policy's (2008) findings of time allocated prior to the enactment of NCLB. The researcher also noted from their professional experience that a 60- to 120-minute literacy block was common in elementary school schedules and the mean fell within the middle of this range. Reading/language arts instruction had a very wide range of 18,700 annual minutes reported for instruction, representing a reported daily instructional block between 25 and 135 minutes, where the lower time allocations appeared to be the outliers, as 60 of the 68 schools (88.2%) reported a daily average of at least 60 minutes or more of reading/language arts instruction.

Mathematics instruction accounted for the second largest proportion of the total reported instructional time (≈ 24%), and when the mean (average) of these time allocations (10,200 minutes) was spread over the average 169-day school year calendar, it equated to a daily

instructional period of approximately 61 minutes, representing approximately 171 annual hours of instruction in mathematics. The researcher noted from their professional experience that a 45- to 75-minute math block was common, and the mean time allocation fell within this observed range. The average amount of time allocated to mathematics instruction found in this study was also notably higher than the average reported by the Center on Education Policy's (2008) findings of time allocated prior to the enactment of NCLB, as also noted for the findings related to reading/language arts instruction. The range for mathematics instruction varied between grade levels because of large differences appearing in grades three and four, with only one school site reporting the maximum amounts which were 6,000-7,000 annual minutes above the next highest reported time allocation.

Social studies and science instruction accounted for nearly the same proportion of total reported instructional time (≈ 10% each). When their means (4,337 and 4,315 minutes respectively) were spread over the average 169-day school year calendar, it equated to a daily instructional period of just over 25 minutes in each subject, representing approximately 72 annual hours of instruction in both social studies and science. These totals were even lower than those from Blank (2013) who reported a weekly average of 2.3 hours of instruction in both social studies and science, representing a daily average of approximately 28 minutes in each subject area. However, the researcher noted from their professional experience that many elementary schools provide either social studies or science instruction each day, rather than providing instruction in both subjects daily, therefore the average daily instructional period may be closer to 51 minutes for either social studies or science. In practice, the researcher noted that they have

observed instructional block schedules between 30- and 60-minutes for social studies or science instruction.

Encore instruction. This section explores the findings and conclusions that can be drawn based on the average amount of time allocated to encore subject matter. These subjects included art, music, and physical education (Smith, 2000).

Art, music, and physical education instruction accounted for similar amounts of instructional time throughout the course of the school year (≈ 7% each). When the means (averages) of each subject (2,898, 3,371, and 3,212 annual minutes respectively) were spread over 169 school days, it equated to a daily instructional period of 17 minutes for art, 20 minutes for music, and 19 minutes for physical education. In the professional experience of the researcher, instruction in either one encore subject per day or splitting the total instructional period between music and physical education, with art instruction typically only taking place one or two days out of a given week was common in elementary scheduling practices. In schools that the researcher has observed, there was often only one teacher for each encore subject who served the entire school, which may have influenced the scheduling capacities of these subjects. Therefore, the researcher concluded that an average daily instructional period of approximately 56 minutes would have encompassed all encore subject instruction, representing approximately 158 annual hours of instruction in art, music, and physical education.

As noted by the ranges between 8,300 and 9,200 annual minutes of instruction for social studies, science, art, music, and physical education. The maximum time allocations for each of these five subject areas represented outliers only reported by a few schools. Based on the findings of these high ranges amongst all seven subject areas, the researcher concluded that it

would be beneficial to monitor how schools report their time allocations and build systems to ensure that time allocations are accurately reported, as some reported time allocations may have skewed results as they were much higher than reported averages.

Summary. Based on the findings of this study, the researcher calculated that there was an average of approximately 721 hours of instructional time reportedly allocated to the seven subjects identified in this study, with nearly 58% (419 hours) of the total reported instructional time having been allocated to reading/language arts and mathematics instruction, 20% (144 hours) of the total reported instructional time having been allocated to science and social studies instruction, and just under 22% (158 hours) of total reported instructional time having been allocated to art, music, and physical education instruction for grades three through five during the 2018-2019 school year. The findings of this study showed a slightly smaller amount of time allocated to encore subjects such as art, music, and physical education instruction compared to Rosenshine's (1981) findings of 24%. However, they also showed a higher average amount of daily minutes being allocated to core instruction (reading/language arts, mathematics, science, and social studies) than previously reported by Rosenshine (1981), with a daily average of 30- to 65-minutes of additional time allocated to instruction.

The findings of this study concluded that a vast majority (58%) of instructional time has still been allocated to reading/language arts and mathematics instruction in Minnesota, with each other, non-tested subjects receiving a much smaller proportion ($\leq$10%) of total instructional time at the elementary level. These findings were supported by research by the Center on Education Policy (2008), Holt (2002), and Judson (2013) who found that instructional time had been

reallocated from non-tested subjects such as social studies, science, art, music, and physical education to focus on tested subjects such as reading/language arts and mathematics.

As much of the previous research and literature reported only the amount of time allocated to instruction, the next research question investigated the potential connections to student achievement outcomes.

Research Question 2

While the first research question sought to examine the amount of time allocated to instruction across select Minnesota elementary schools, the second research question examined the relationship between the amount of instructional time and student achievement levels. It asked:

> *To what extent was there a relationship between time allocated to instruction in: Reading/Language Arts, Math, Science, Social Studies, Art, Music, and Physical Education for grades three through five during the 2018-2019 school year and student achievement as measured by the 2019 Minnesota Comprehensive Assessments in Reading and Math across select Minnesota public elementary schools?*

The results of the study, as related to this question, were reported in terms of effect sizes (ranging from -1.0 to 1.0) as measured by the Pearson product-moment coefficient correlation test (Pearson *r*) and p-values (ranging from 0.0 to 1.0) as measured by 2-tailed significance testing.

Positive effects. The amount of time allocated to two subject areas showed significant positive relationships to student achievement in both reading and math during the 2018-2019

school year. This suggested that as instructional time increased, student proficiency rates increased as well.

Increased time allocations for reading/language arts instruction generated small positive effects. There was an expected positive relationship between reading/language arts instruction and reading achievement, but a surprisingly similar relationship to math achievement. This study did not investigate the instructional strategies implemented during reading or math instruction that may have impacted student achievement outcomes in both areas. However, McIntyre et al. (n.d.) had investigated instructional strategies during reading instruction and found that a instructional time was commonly allocated to independent reading, which they did not find to have a positive relationship with student achievement. Therefore, the researcher recommended future research to investigate the instructional strategies and activities used during reading/language arts instruction. Much of the previous research focusing on student achievement focused on literacy instruction, and Minnesota policies such as Read Well by Third Grade (Minn. Stat. § 120B.12, 2001) and the World's Best Workforce (Minn. Stat. § 120B.11, 2013) legislation, have focused on improving reading achievement over the past two decades, therefore, it would be logical to see a positive correlation between reading/language arts instruction and reading achievement. The study results related to question one also indicated that approximately 34% of all instructional time is devoted to reading/language arts instruction, and the researcher has noted this trend in their professional experience. However, it was interesting to note the relatively small effect size as an effect of 0.26 would suggest a percentile rank increase of approximately nine points in reading achievement for students who were provided with additional reading/language arts instructional time when compared to a normal curve equivalent

(Creswell & Guetterman, 2019). There was no related literature found which suggested a possible relationship between reading/language arts instruction and math achievement outcomes. However, from the researcher's professional experience they have witnessed reading strategies being utilized to aid students in solving real-world mathematical problems, often in the form of word or story problems, which would support the findings of a small positive effect ($r = 0.29$) between reading/language arts instruction and math achievement. Therefore, because of the small effects found from reading/language arts instruction, additional research investigating the quality, consistency of instruction, and integration of strategies may be valuable.

Increased time allocations for physical education instruction generated the largest effects found in this study amongst all seven instructional subjects. Multiple studies concluded that there appeared to have been positive relationships both academically and behaviorally when correlated with physical activity and physical education instruction (Finnan et al., 2015; Fraser et al., 2003; Hunt et al, 2010). The researcher also noted the significant effect sizes of 0.64 and 0.59 which would translate to an average growth of 22 percentile points on reading achievement tests and 20 percentile points on math achievement tests as compared to a normal curve equivalent (Creswell & Guetterman, 2019). The researcher has noticed in their professional experience that some elementary schools are offering daily physical education instruction in addition to recess and other movement breaks. They also noted that students seemed to be more focused on academic tasks after having opportunities for movement breaks. Therefore, it may be beneficial to conduct further research related to the relationships between physical education and physical activity opportunities and student achievement outcomes.

Negative effects. The amount of time allocated to three subject areas showed significant negative relationships to student achievement in both reading and math during the 2018-2019 school year. This suggested that as instructional time increased, student proficiency rates decreased as well.

Music instruction yielded small negative effects in reading and math achievement (r = -0.28 and r = 0.27). This suggested that as instructional time allocations increased for music, student proficiency rates in reading and math decreased. Conversely, Brenner & May (2016) found increased learning outcomes in early reading skills, which were not analyzed in this study, as this study focused on grades three through five, versus kindergarten through grade two. Therefore, there may be value in further research exploring the relationship between the amount of time allocated to music instruction and reading achievement outcomes in kindergarten through grade two. In the researcher's experience, music instruction may only be offered on an every-other-day basis, and therefore not provide enough consistency for students to master skills that may support reading development. Therefore, further research exploring the relationships between the quality, consistency, and integration of music instruction, and their relationship to reading and math achievement may be valuable for instructional leaders.

Overall, there was limited existing research which focused on elementary science and social studies instruction. The researcher also observed in their professional experience that science and social studies content was often presented within reading/language arts curriculum and instructional blocks, which may have taken away opportunities to apply reading strategies and skills during the science or social studies block of instruction. Blank (2013) found there to be positive relationships between the amount of time allocated to science instruction and science

achievement, however this study did not investigate any relationship to science instruction since achievement data is not available for grades three, four, and five, with science only being assessed by the Minnesota Comprehensive Assessments in grade five. Therefore, there may be value in further research into these subject areas specifically to identify the integration and consistency of subject matter instruction. The researcher also noted from their professional experience that providing students with science and social studies subject matter was crucial to building their background knowledge, and therefore does not advocate for simply removing instructional time in these areas based on the findings of negative relationships between the amount of time allocated to these two subjects and student achievement in both reading and mathematics.

Insignificant effects. The amount of time allocated to mathematics instruction yielded extremely weak positive effect in both reading ($r = 0.07$) and math ($r = 0.04$) achievement. This suggested that as instructional time allocations increased for mathematics, student proficiency rates in math increased only slightly, however, these correlations were not statistically significant for the relationship between mathematics instruction and reading achievement ($p = 0.57$) or math achievement ($p = 0.73$). As both p-values far exceeded the maximum risk level set for this study of 0.05, the researcher had to conclude that the null hypothesis was true and that there was no significant relationship between mathematics or art instruction and math achievement.

It was surprising to find that there was such a weak and insignificant relationship between the amount of time allocated to mathematics instruction and math achievement, as compared with the amount of time allocated to reading/language arts instruction and reading achievement. Effects of 0.07 and 0.04 would suggest an increase of only one or two percentile points of

improvement based on a normal curve equivalent (Creswell & Guetterman, 2019). Effects of this size are not statistically significant and there was a high level of risk that there were other variables impacting these outcomes. The researcher had found from their professional experience that mathematics content builds sequentially, moving from basic number sense to algebraic thinking, whereas the subject of reading/language arts revolves around the application of similar strategies over time to increasingly more complex text, and therefore, if instructional time is focused only on grade level mathematics content, and doesn't support further development of prerequisite skills, struggling students may not reach a high level of proficiency. Berliner (1978) also noted that students needed to be provided mathematics instruction at their level, therefore, students need to have the prerequisite skills necessary to engage with grade level content as found within the Minnesota Comprehensive Assessments in math. Therefore, future research related to mathematical instructional practices should investigate the quality, consistency, and sequence of skills taught at each grade level (Show how this is connected to prerequisite skills).

Summary. As reading/language arts and physical education instruction yielded positive effects of 0.2 or greater, Cohen's Index (1988) suggested that there could be practical significance in increasing instructional time for both reading/language arts and physical education instruction and other opportunities for physical activity to support increasing student achievement outcomes in reading for grades three through five (as cited in McMillan & Schumacher, 2010). Although the amount of time allocated to science, social studies, and music instruction yielded negative effects of -0.2 or greater, the researcher would be cautious to make drastic changes without further investigating the quality, consistency, and integration of instruction in science, social studies, and music content, and their relationship to student

achievement outcomes in reading and math for grades three through five (as cited in McMillan & Schumacher, 2010). Other previous studies have shown that many schools decreased the amount of time allocated to science, social studies, and music instruction since the implementation of NCLB (Center on Education Policy, 2008; Blank, 2013). However, since many of these studies did not investigate the relationship between the changes in the amount of time allocated to instruction and the possible changes in student achievement outcomes, additional research would be recommended to further support these findings to better inform the decision-making process of educational policy leaders.

Limitations

The limitations of a study are "particular features that you know may affect the results or your ability to generalize the findings" and "involve areas over which you have little or no control" (Hyatt & Roberts, 2019, p. 154).

1. Utilizing secondary data, which was collected previously, did not allow the researcher to follow-up with schools with inconsistencies in their reporting.
2. Schools did not report time allocations for all subject areas analyzed in this study: reading/language arts, mathematics, science, social studies, art, music, and physical education. Therefore, the study sample represented only 16.2% of the study population (68 out of 419 schools).
3. Reported time allocations were inconsistent with common school schedules as some schools reported as few as one minute per day of instruction, and others reported as many as six hours per day of instruction in each subject area. Therefore, the researcher only

included schools which reported between 4,000 and 25,000 annual minutes of instruction in both reading/language arts and mathematics instruction, representing an average of 30- to 150-minutes of daily instruction.

Recommendations

Based on the review of literature, findings of the study, and conclusions made based on the results of the study, the researcher offered the following recommendations.

Recommendations for the Field

The following are the researcher's recommendations for the field based on the related literature, findings, and conclusions of this study:

1. Based on the related literature and results of this study, school leaders should monitor the opportunities students have for daily physical activity and physical education instruction and consider possible changes in the amount of opportunities students receive throughout the school day.
2. Based on the findings of this study, school leaders and educators should investigate how science and social studies content may be integrated with reading and mathematics instruction and skills practice.
3. Based on the findings of this study, school leaders and educators should monitor the quality and consistency of instruction being provided across subject areas to ensure that students are engaged in meaningful learning activities.
4. Based on an analysis of the original data set of this study, a uniform system of reporting should be created to ensure accurate reporting of instructional time allocations by each

school in the state of Minnesota. This would ensure that time allocations are not drastically under- or over-reported for each subject area.

5. Based on an analysis of the original data set of this study, the reporting system may consider asking schools to report the average daily instructional time allocation and then multiply it by the school's annual days of instruction to calculate the average annual minutes of instruction as this may aid in reducing errors in data entry.

Recommendations for Future Research

The following are the researcher's recommendations for future research based on previous literature presented in this study along with the findings and conclusions of this study:

1. Conduct a quantitative survey of elementary principals or teachers to identify the amount of time being allocated to instruction across subject areas in their schools and classrooms, correlate these time allocations with their student achievement levels.
2. Conduct a replication of this study's analysis of secondary data collected from the Minnesota Department of Education utilizing longitudinal data from multiple school years.
3. Conduct a replication of this study's methodology to include instructional time allocations for kindergarten through grade two and common measures of student achievement in reading and math such as the Formative Assessment System for Teachers (FAST), the Measure of Academic Progress (MAP) tests, or the Renaissance STAR tests.
4. Conduct a replication of this study's methodology to include the relationship between instructional time allocations for grades six through eight and student achievement

proficiency levels as measured by the Minnesota Comprehensive Assessments in reading and math.

5. Conduct a study which compares the relationship between the amount of time allocated to instruction and student achievement to school demographics such as: Title I status, special education rates, English language proficiency, and/or racial composition to further investigate if there are relationships between these additional variables and the amount of time allocated to instruction in various subject areas.

Summary

The purpose of this study was to investigate the extent to which time was allocated to instruction across core and encore subjects including reading/language arts, mathematics, science, social studies, art, music, and physical education, and the correlation between the amount of time allocated to instruction and student achievement in reading and math. The study utilized data that was reported by elementary schools to the Minnesota Department of Education prior to the COVID-19 pandemic to determine how much time was allocated to instruction in each subject across grades three through five during the 2018-2019 school year.

Based on the findings of this study, the researcher concluded that most of the instructional time was allocated to tested subjects including reading and mathematics, and that a minimal proportion of time was allocated to encore subject matter instruction. The researcher also concluded that there was a significant positive relationship between the amount of time allocated to reading/language arts and physical education instruction and student achievement in both reading and math.

Providing students with the time to learn is essential to their development and achievement. Time is a resource that educational leaders can control at all levels. School leaders and educational policy makers must consider the impacts that subject matter instruction and learning opportunities have on student outcomes and plan accordingly. It is recommended that school leaders and teachers audit the amount of time they currently allocate to subject matter instruction and related learning opportunities, as well as the level of engagement they acquire during instructional times. Finding the formula that works best for each school and classroom can promote positive outcomes for students throughout their educational journey.

References

Abbiati, G. & Meroni, E. C. (2016). How do students react to longer instruction time? Evidence from Italy. *Education Economics*, *24*(6), 592–611. https://doi.org/10.1080/09645292.2015.1122742

Adelman, N. E., Haslam, M. B., & Pringle, B. A. (1996). *The uses of time for teaching and learning*. U.S. Dept. of Education, Office of Educational Research and Improvement, Office of Reform Assistance and Dissemination: For sale by the U.S. G.P.O. Supt. of Docs.

Alford, B. L., Padrón, Y. N., Rollins, K. B., & Waxman, H. C. (2016). Using Systematic Classroom Observation to Explore Student Engagement as a Function of Teachers' Developmentally Appropriate Instructional Practices (DAIP) in Ethnically Diverse Pre-kindergarten Through Second-Grade Classrooms. *Early Childhood Education Journal*, *44*(6), 623–635. https://doi.org/10.1007/s10643-015-0748-8

American Psychological Association. (2014). Early Elementary School Start Times Tougher on Economically Advantaged Children. *Education Digest*, *80*(4), 59–60.

Association for Supervision and Curriculum Development. (2015). *Elementary and secondary education act: comparison of the no child left behind act to the every student succeeds act.*

Barrios, A. & Bovini, G. (2017). *It's time to learn: understanding the differences in returns to instruction time.* Centre for Economic Performance, London School of Economics and Political Science. London.

Bergin, T. (2018). *An introduction to data analysis: quantitative, qualitative and mixed methods.* Sage Publications, Inc. London, United Kingdom

Berliner, D. C. (1978). *Allocated Time, Engaged Time and Academic Learning Time in Elementary School Mathematics Instruction.* 24.

Blank, R. K. (2013). Science Instructional Time Is Declining in Elementary Schools: What Are the Implications for Student Achievement and Closing the Gap?: ELEMENTARY SCIENCE INSTRUCTIONAL TIME DECLINING. *Science Education*, *97*(6), 830–847. https://doi.org/10.1002/sce.21078

Brenner, B. & May, L. (2016). The role of the arts in school reform. *Arts Education Policy Review*, *117*(4), 223–229. https://doi.org/10.1080/10632913.2016.1213121

Caldwell, J., Huitt, W., & Graeber, A. (1982). Time spent in learning: implications from research. *The Elementary School Journal*, 82(5), 470–480.

Carroll, J. B. (1963). A model of school learning. *Teachers College Record.* 64, 723-733.

Cattaneo, M. A., Oggenfuss, C., & Wolter, S. C. (2017). The more, the better? The impact of instructional time on student performance. *Education Economics*, *25*(5), 433–445. https://doi.org/10.1080/09645292.2017.1315055

Center on Education Policy. (2008). Instructional Time in Elementary Schools: A Closer Look at Changes for Specific Subjects. *Arts Education Policy Review*, *109*(6), 23–28. https://doi.org/10.3200/AEPR.109.6.23-28

Checkoway, A., Gamse, B., Linkow, T. & Velez, M. (2013). *Evaluation of the Massachusetts expanded learning time (ELT) initiative: Final study findings.* Abt Associates Inc.

Chudowsky, N., Chudowsky, V., Kober, N., Joftus, S., Renter, D. & Scott, C. (2006). *From the capital to the classroom: year 4 of the No Child Left Behind Act.* Center on Education Policy. Washington, D.C.

Creswell, J. & Guetterman, T. (2019). *Educational research: planning, conducting, and evaluating quantitative and qualitative research.* (6th ed.). Pearson Education, Inc. Upper Saddle River, New Jersey.

Dobbie, W. & Fryer, R. (2013). Getting beneath the veil of effective schools: evidence from New York City. *American Economic Journal: Applied Economics*, 5(4), 28-60.

Dupuis, D. N. (2015). *The association between elementary school start time and students' academic achievement in Wayzata Public Schools.* 12.

Education Commission of the States. (2020). *50 state comparison: instructional time.*

Finnan, C. (2014). *Not a waste of time: scheduling non-academic learning activities into the school day.* Springer Science+Business Media. New York, NY.

Fraser, R., Graham, G., Parker, S., Tembo, M., Westfall, S. & Wilkins, J. (2003). Time in the arts and physical education and school achievement. *Curriculum Studies, 23(6),* 721-734.

Frye, B., Maruyama, G., & Taylor, B. (1990). *Time spent reading and reading growth.* American Educational Research Journal. 27, 351-362.

Gettinger, M. (1985). *Effects of Maximizing Time Spent and Minimizing Time Needed for Learning on Pupil Achievement*. 20.

Gettinger, M. (1989). *Time Allocated and Time Spent Relative to Time Needed for Learning as Determinants of Achievement*. 9.

Holt, M. (2002). It's Time to Start the Slow School Movement. *Phi Delta Kappan*, *84*(4), 264. https://doi.org/10.1177/003172170208400404

Hunt, G., Norvell, B. & Ratcliff, N. (2010). Give me a break: the argument for recess. *Childhood Education.* Winter, 2009-2010.

Hyatt, L. & Roberts, C. (2019). *The dissertation journey: a practical and comprehensive guide to planning, writing, and defending your dissertation.* (3rd ed.). Corwin, Sage Publishing. Thousand Oaks, CA.

Judson, E. (2013). The Relationship Between Time Allocated for Science in Elementary Schools and State Accountability Policies: ACCOUNTABILITY AND TIME ALLOCATED FOR SCIENCE. *Science Education*, *97*(4), 621–636. https://doi.org/10.1002/sce.21058

Karweit, N. (1984). Time-on-Task Reconsidered: Synthesis of Research on Time and Learning. *Educational Leadership*, *41*(8), 32.

Kidron, Y. & Lindsay, S. (2014). *The effects of increased learning time on student academic and nonacademic outcomes: Findings from a meta-analytic review.* (REL 2014– 015). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Appalachia

Kingsbury, A. (2007). *Schools cut other subjects to teach reading and math.* U.S. News & World Report

Kubow, P. K., Wahlstrom, K. L., & Bemis, A. (1999). Starting Time and School Life. (Cover story). *Phi Delta Kappan*, *80*(5), 366.

Lavy, V. (2010). *Do Differences in School's Instruction Time Explain International Achievement Gaps in Maths, Science and Language? Evidence from Developed and Developing Countries*. 56.

Linn, R. (2008). *Toward a more effective definition of adequate yearly progress.* In Sunderman, G. (Ed.), Holding NCLB accountable: achieving accountability, equity, and school reform. Corwin Press. Thousand Oaks, CA. 27-42.

McIntyre, E., Petrosko, J., Powell, R., Powers, S., & Rightmyer, E. (n.d.). *How Much Should Young Children Read? A Study of the Relationship Between Development and Instruction*. Literacy Teaching and Learning. *11*(1), 23.

McMillan, J. & Schumacher, S. (2010). *Research in education: evidence-based inquiry.* (7th ed.). Pearson Education, Inc. Upper Saddle River, New Jersey.

McMurrer, J. (2008). *Instructional time in elementary schools: a closer look at changes in specific subjects.* Center on Education Policy. Washington D.C.

Minnesota Statute § 120B.11 (2013). Retrieved July 25, 2021, from https://www.revisor.mn.gov/statutes/cite/120B.11/pdf

Minnesota Statute § 120B.12 (2001). Retrieved July 25, 2021, from https://www.revisor.mn.gov/statutes/cite/120B.12/pdf

National Research Council. (2011). Successful K-12 STEM education: Identifying effective approaches in science, technology, engineering, and mathematics. Board on Science Education and Board on Testing and Assessment. Washington, DC: National Academy Press.

New York City Board of Education. (2000). *Analyses of performance of extended-time and non-extended time surr schools flash research report #1.* Division of Assessment & Accountability. New York City, NY.

Organization for Economic Cooperation and Development. (2018). *Education at a glance 2018: OECD indicators.* OECD Publishing.

Organization for Economic Cooperation and Development. (2018). *PISA 2018: highlight indicators.* OECD: Education GPS. https://gpseducation.oecd.org/IndicatorExplorer?plotter=h5&query=2&indicators=R000*R004*R006*R007*R008*R095*R096*R003*R011*R012*R002*R009*R010*M000*M004*M006*M007*M008*M095*M096*M003*M011*M012*M002*M009*M010*S000*S004*S006*S007*S008*S095*S096*S003*S011*S012*S002*S009*S010*N058*N059*N017*N081*N288*N121*N123*N122*N125*N126*N206*N278*N282*N283*N004*N005*N164*N276*N190*N284*N285*N286*N275*N287*N289*N213*N277*N273*N274*R019*R053*R054*R055*R056*R057*R058*R061*R062*R063*R064*R065*R066*R073*R074*R075*R026*R052*R097*N011*N128*N279*N280*N281*N090*X019*X020*X021*X022*X023*X025*X026*X027*X028*X029*X030*X031

Pompelia, S. (2019). *Hitting Snooze on School Start Times*. Retrieved July 20, 2020, from https://ednote.ecs.org/hitting-snooze-on-school-start-times/

Proficiency Levels in Assessments of Reading and Mathematics. (2017). *Educational Research Centre.* Dublin, Ireland

Rosenshine, B. V. (1981). How time is spent in elementary classrooms. *Journal of Classroom Interaction, 17(1),* 16-25.

Smith, B. (2000). Quantity Matters: Annual Instructional Time in an Urban School System. *Educational Administration Quarterly*, *36*(5), 652–682. https://doi.org/10.1177/00131610021969155

Stringfield, S., & Teddie, C. (1988). A Time to Summarize: The Louisiana School Effectiveness Study. *Educational Leadership*, *46*(2), 43.

United States Department of Education. (2019). *The Nation's Report Card. https://www.nationsreportcard.gov/profiles/stateprofile?chort=1&sub=MAT&sj=&sfj=NP&st=MN&year=2019R3*

Woods, J. R. (2015). *Instructional Time Trends*. 5.

Appendix A: Frequency Counts

Table 6

Frequency Counts: Days of Instruction

n = 68	**Frequency**	**%**
142	1	1.5
164	1	1.5
166	10	14.7
167	5	7.4
169	20	29.4
170	6	8.8
171	23	33.8
172	1	1.5
174	1	1.5
Total	68	100.0

Table 7

Frequency Counts: Annual Minutes Allocated to Reading/Language Arts Instruction

	Grade 3		**Grade 4**		**Grade 5**	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
4,260	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,720	5	7.4	5	7.4	5	7.4
8,400	1	1.5	1	1.5	1	1.5
9,960	10	14.7	10	14.7	10	14.7
10,200	6	8.8	6	8.8	6	8.8
12,654	3	4.4	3	4.4	3	4.4
14,196	1	1.5	0	0.0	0	0.0
14,872	0	0.0	1	1.5	0	0.0
15,390	19	27.9	19	27.9	19	27.9
18,928	0	0.0	0	0.0	1	1.5
20,400	1	1.5	1	1.5	1	1.5
21,450	19	27.9	19	27.9	19	27.9
22,960	1	1.5	1	1.5	1	1.5
Total	68	100.0	68	100.0	68	100.0

Table 8

Frequency Counts: Annual Minutes Allocated to Mathematics Instruction

	Grade 3		Grade 4		Grade 5	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
4,260	1	1.5	1	1.5	1	1.5
5,100	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,327	3	4.4	3	4.4	3	4.4
6,720	5	7.4	5	7.4	5	7.4
7,560	1	1.5	1	1.5	1	1.5
9,960	10	14.7	10	14.7	10	14.7
10,200	6	8.8	6	8.8	6	8.8
10,260	19	27.9	19	27.9	19	27.9
12,275	19	27.9	19	27.9	19	27.9
13,120	1	1.5	1	1.5	1	1.5
14,535	0	0.0	0	0.0	1	1.5
19,665	1	1.5	0	0.0	0	0.0
20,520	0	0.0	1	1.5	0	0.0
Total	68	100.0	68	100.0	68	100.0

Table 9

Frequency Counts: Annual Minutes Allocated to Social Studies Instruction

	Grade 3		Grade 4		Grade 5	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1,350	10	14.7	10	14.7	10	14.7
1,710	2	2.9	2	2.9	2	2.9
2,052	0	0.0	1	1.5	0	0.0
2,565	1	1.5	0	0.0	1	1.5
3,300	19	27.9	19	27.9	19	27.9
4,104	16	23.5	16	23.5	16	23.5
4,260	1	1.5	1	1.5	1	1.5
4,920	1	1.5	1	1.5	1	1.5
5,100	1	1.5	1	1.5	1	1.5
5,643	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,327	3	4.4	3	4.4	3	4.4
6,720	5	7.4	5	7.4	5	7.4
7,560	1	1.5	1	1.5	1	1.5
10,200	6	8.8	6	8.8	6	8.8
Total	68	100.0	68	100.0	68	100.0

Table 10

Frequency Counts: Annual Minutes Allocated to Science Instruction

	Grade 3		Grade 4		Grade 5	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1,350	10	14.7	10	14.7	10	14.7
1,710	2	2.9	2	2.9	2	2.9
2,052	0	0.0	1	1.5	0	0.0
2,565	1	1.5	0	0.0	1	1.5
3,300	19	27.9	19	27.9	19	27.9
4,104	17	25.0	17	25.0	17	25.0
4,260	1	1.5	1	1.5	1	1.5
4,920	1	1.5	1	1.5	1	1.5
5,100	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,327	3	4.4	3	4.4	3	4.4
6,720	5	7.4	5	7.4	5	7.4
7,560	1	1.5	1	1.5	1	1.5
10,200	6	8.8	6	8.8	6	8.8
Total	68	100.0	68	100.0	68	100.0

Table 11

Frequency Counts: Annual Minutes Allocated to Music Instruction

	Grade 3		Grade 4		Grade 5	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1,881	2	2.9	2	2.9	2	2.9
2,184	10	14.7	10	14.7	10	14.7
2,460	1	1.5	1	1.5	1	1.5
2,475	19	27.9	19	27.9	19	27.9
2,550	4	5.9	4	5.9	4	5.9
2,565	17	25.0	17	25.0	17	25.0
4,260	1	1.5	1	1.5	1	1.5
4,446	1	1.5	1	1.5	1	1.5
5,100	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,327	3	4.4	3	4.4	3	4.4
6,720	5	7.4	5	7.4	5	7.4
7,560	1	1.5	1	1.5	1	1.5
10,200	2	2.9	2	2.9	2	2.9
Total	68	100.0	68	100.0	68	100.0

Table 12

Frequency Counts: Annual Minutes Allocated to Physical Education Instruction

	Grade 3		Grade 4		Grade 5	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1,650	19	27.9	19	27.9	19	27.9
1,881	2	2.9	2	2.9	2	2.9
2,184	10	14.7	10	14.7	10	14.7
2,550	4	5.9	4	5.9	4	5.9
2,565	17	25.0	17	25.0	17	25.0
4,260	1	1.5	1	1.5	1	1.5
4,446	1	1.5	1	1.5	1	1.5
5,100	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,327	3	4.4	3	4.4	3	4.4
6,720	5	7.4	5	7.4	5	7.4
7,560	1	1.5	1	1.5	1	1.5
7,872	1	1.5	1	1.5	1	1.5
8,500	1	1.5	0	0.0	0	0.0
10,200	1	1.5	2	2.9	2	2.9
Total	68	100.0	68	100.0	68	100.0

Table 13

Frequency Counts: Annual Minutes Allocated to Art Instruction

	Grade 3		Grade 4		Grade 5	
n = 68	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1,026	17	25.0	17	25.0	17	25.0
1,700	4	5.9	4	5.9	4	5.9
1,872	1	1.5	1	1.5	1	1.5
1,881	2	2.9	2	2.9	2	2.9
2,184	10	14.7	10	14.7	10	14.7
2,460	1	1.5	1	1.5	1	1.5
2,475	19	27.9	19	27.9	19	27.9
4,260	1	1.5	1	1.5	1	1.5
5,100	1	1.5	1	1.5	1	1.5
5,985	1	1.5	1	1.5	1	1.5
6,327	3	4.4	3	4.4	3	4.4
6,720	5	7.4	5	7.4	5	7.4
7,560	3	1.5	3	1.5	3	1.5
10,200	2	2.9	2	2.9	2	2.9
Total	68	100.0	68	100.0	68	100.0

Appendix B: IRB Approval

ST. CLOUD STATE UNIVERSITY
EDUCATION FOR LIFE.

Institutional Review Board (IRB)

720 4th Avenue South AS 210, St. Cloud, MN 56301-4498

Name: Cody Lewis

Email: faco1101@go.stcloudstate.edu

IRB PROTOCOL DETERMINATION: Exempt Review

Project Title Relationship Between Time Allocated to Instruction and Elementary Student Achievement Across Minnesota Public Schools

Advisor John Eller

The Institutional Review Board has reviewed your protocol to conduct research involving human subjects. Your project has been: **APPROVED**

Agency has informed PI that a data sharing agreement will not be issued at their end and that the data being shared does not violate the privacy of participants who have contributed to the data. PI will receive data with school district and names which will be subsequently de-identified by PI using a coding system. No individual student data will be shared with PI.

Please note the following important information concerning IRB projects:

- The principal investigator assumes the responsibilities for the protection of participants in this project. Any adverse events must be reported to the IRB as soon as possible (ex. research related injuries, harmful outcomes, significant withdrawal of subject population, etc.).

- For expedited or full board review, the principal investigator must submit a Continuing Review/Final Report form in advance of the expiration date indicated on this letter to report conclusion of the research or request an extension.

-Exempt review only requires the submission of a Continuing Review/Final Report form in advance of the expiration date indicated in this letter if an extension of time is needed.

- Approved consent forms display the official IRB stamp which documents approval and expiration dates. If a renewal is requested and approved, new consent forms will be officially stamped and reflect the new approval and expiration dates.

- The principal investigator must seek approval for any changes to the study (ex. research design, consent process,

If we can be of further assistance, feel free to contact the IRB at 320-308-4932 or email ResearchNow@stcloudstate.edu and please reference the SCSU IRB number when corresponding.

IRB Chair:

Dr. Mili Mathew
Chair and Graduate Director
Assistant Professor
Communication Sciences and Disorders

IRB Institutional Official:

María-Claudia Tomany

Dr. Claudia Tomany
Associate Provost for Research
Dean of Graduate Studies

OFFICE USE ONLY

SCSU IRB#: 2041 - 2652	**Type:** Exempt Review	**Today's Date:** 7/13/2021
1st Year Approval Date: 7/12/2021	**2nd Year Approval Date:**	**3rd Year Approval Date:**
1st Year Expiration Date:	**2nd Year Expiration Date:**	**3rd Year Expiration Date:**