

THE IMPACT OF FLEXIBLE INTERDISCIPLINARY BLOCK SCHEDULING
ON READING ACHIEVEMENT

by

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DISSERTATION ABSTRACT

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The purpose of this study was to examine whether the use of a middle school flexible interdisciplinary block schedule would increase eighth-grade students' reading scores, as measured by the Oregon Assessment of Knowledge and Skills (OAKS). A 90-minute middle school flexible interdisciplinary block schedule served as the independent variable and was evaluated to determine its impact on student reading achievement. Extant data from the OAKS was used to assess student learning. Extant data from two groups of students were examined. The treatment group had their eighth-grade language arts and social studies classes scheduled into 90-minute flexible interdisciplinary block periods, taught by the same teacher. The comparison group had their eighth-grade language arts and social studies classes scheduled into traditional 45-minute departmentalized periods, taught by two separate teachers. The overall amount of time allocated to language arts and social studies instruction within the academic year was the same for both groups. However, the way the time was flexed and utilized within the class periods differed between the two groups. Research Question 1 addressed the possible increase in mean OAKS reading scores over time. Research Question 2 addressed the

possible differences in the mean OAKS Reading Achievement Standards cut scores over time. The results of the two-year treatment condition of a FIBS for language arts instruction did not result in statistically significant results, as measured by the OAKS. The results suggest that there may not be a significant achievement difference between schools that implement an interdisciplinary scheduled compared to schools that implement a traditional, departmental approach.

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TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Interdisciplinary Instruction.....	2
Interdisciplinary versus Departmentalized Instruction	3
Language Arts and Social Studies Interdisciplinary Instruction.....	4
Reading Achievement Remains Low in the US	6
Transfer of Learning	8
Reflexive Transfer	9
Mindful Transfer.....	9
Transfer as a Teaching Tool	9
Hugging.....	10
Bridging	10
Transfer in the Interdisciplinary Classroom	11
Transfer in the Single-Subject Classroom	12
Flexible Interdisciplinary Block Scheduling	13
National Recommendations for the Use of FIBS	15
This We Believe.....	16
Turning Points.....	17
A Paradigm Shift from Traditional Scheduling May Be Needed.....	18
Examining FIBS in an Oregon District.....	20
II. REVIEW OF RESEARCH	22
A Conceptual Framework for Reforming Schools through a Flexible Use of Time	24
Flexible Modular Scheduling.....	24
The Model Schools Project of 1969.....	25
A Nation at Risk.....	26
Prisoners of Time.....	27
The Relation Between Time and Learning	28
Seminal Research on Time and Learning: Model of School Learning.....	29
Carroll’s Influence on Bloom’s Mastery Learning Model	31
Carroll’s Influence on Modern-Day Reform Efforts	31
Empirical Research that Tested the Model of School Learning	32
Process-Product Research and Its Relation to MSL	34
Larger Blocks of Allotted Time: Effects on Instruction and Student Learning.....	35
Differences between a FIBS Classroom and a Traditional Classroom.....	38
The Effects of Larger Blocks of Allotted Time on Student Learning	39
Research on FIBS Is Generally Inconclusive	45
Research Question	47
III. METHODOLOGY	48

Chapter	Page
Research Design.....	48
Study Participants	49
Treatment Group (TG).....	49
Comparison Group (CG).....	50
Initial Group Differences	51
Setting	53
Teachers	53
Intervention	54
Instructional Differences between Groups.....	55
Reading Measures	55
Data Collection	56
OAKS Administration Procedures.....	56
Fidelity of Implementation of OAKS	57
Content Validity.....	57
Construct Validity.....	57
Reliability.....	58
Research Question and Hypotheses	59
Data Analysis	59
Descriptive Statistics.....	59
Analysis of Variance.....	60
IV. RESULTS	61
Question 1: Mean Differences in OAKS Scores Between Groups Over Time	61
Visual Display for Question 1.....	63
Question 1 Summary.....	64
Question 2: Mean Differences in OAKS Achievement Standards Cut Scores	
Between Groups Over Time	64
Visual Display for Question 2.....	66
Question 2 Summary.....	67
Overall Results Summary	68
V. DISCUSSION	69
Summary of Study	69
Selection of Schools.....	70
Treatment School	70
Comparison School.....	70
Differences in School Schedules	71
Outcome Measure	71
Assessment Timeline	72
Measuring Intervention Impact Using a Reading Achievement Measure	72
Analysis.....	73
Results.....	73
Plausible Explanations for the Findings	74
Intervention Implementation in Treatment and Comparison Classrooms	74

Chapter	Page
Measurement Tool	75
True Lack of a Treatment Effect.....	76
Socio-economic Status.....	76
High Expectations.....	77
Limitations of the Study.....	78
Study Design.....	78
Measure of Implementation Fidelity.....	78
Social Validity Measure.....	78
Teacher Sample.....	79
Experience.....	79
Training.....	80
Post-test Administration.....	80
Future Research	81
Socio-economic Status.....	81
Mixed Methods Research	81
Fidelity of Measurement.....	82
Conclusion	82
REFERENCES CITED.....	84

LIST OF FIGURES

Figure	Page
1. NAEP Average Scale Scores for Eighth Grade Reading from 1998 and 2011	7
2. Change in OAKS Group Score Means over Time.....	63
3. Change in OAKS Achievement Standards Means over Time.....	67

LIST OF TABLES

Table	Page
1. Qualitative Studies Examining the Effects of a Block Schedule on Classroom Instruction	36
2. Studies Examining the Effects of a Block Schedule on Student Learning.....	40
3. Student Groups Summarized.....	49
4. Demographic Data.....	51
5. Teachers' Experience and Training.....	54
6. OAKS Descriptive Statistics.....	62
7. OAKS Scores by Group Two-Way Repeated Measures Summary.....	63
8. OAKS Reading Achievement Standards Cut Scores from 2006-2010.....	65
9. OAKS Reading Cut Scores Descriptive Statistics	66
10. OAKS Reading Cut Scores by Group Two-Way Repeated Measures Summary.....	66

CHAPTER I

INTRODUCTION

In the middle grades (sixth through eighth), the structure of how students are taught core subjects varies on a continuum from self-contained classrooms where elementary-certified teachers instruct students in multiple subjects, to interdisciplinary classrooms where dual-licensed teachers instruct students in two different subjects, to departmentalized classrooms where students are taught each subject by different, single-licensed teachers. Research is needed to determine the benefits of one type of middle school structure over another in terms of academic, behavior, and affective student outcomes. This study compared an interdisciplinary approach with a departmentalized approach and examined the impact on student academic achievement.

Departmentalized instruction in middle school became popular in part because of the efficiency of specialization in industry. For example, in the home building industry, responsibilities are highly compartmentalized. Workers tend to specialize in one skill area and work only in that particular area. Electricians install the home's wiring and electrical circuits, while plumbers install the water pipes.

In education, middle school teachers trained in math education teach mathematics and teachers trained in science disciplines teach science, with the proposed advantage being having teachers with expertise in a particular discipline teach that discipline. Most high schools and colleges still utilize a departmentalized system for organizing course instruction, in part because of the advanced learning that must occur at these levels. Experts assert that a departmentalized approach in the middle grades may promote higher student achievement in core academic subjects such as reading, writing, mathematics,

science and social studies because subject-area experts provide the instruction (Mac Iver & Epstein, 1993; Manning & Bucher, 2012; Powell, 2011).

In the home building industry, however, there are also general contractors who frequently have advanced skills in more than one skill area. In education, the equivalent would be interdisciplinary teachers. Interdisciplinary teachers have advanced subject-area and pedagogical knowledge in more than one discipline. A hypothesized advantage of interdisciplinary instruction (i.e., teachers that teach more than one subject to the same students) with early adolescents is that it may promote closer relationships between students and teachers, which may translate into greater willingness to learn and stronger connectivity to the school (Mac Iver & Epstein, 1992; McEwin & Greene, 2010). A potential disadvantage is that interdisciplinary teachers may not have as much subject-area knowledge in both disciplines they are responsible for teaching (Vars, 2001). In essence, the dilemma faced by educational leaders is how to structure middle schools to make optimal use teachers' subject-area expertise, while also maximizing the likelihood that teachers and students feel connected, and that students feel like their teachers really know them and care about their problems.

Interdisciplinary Instruction

In middle school education, the combining of different curriculum areas is called interdisciplinary teaching. In an interdisciplinary model, middle-level educators are expected to be familiar with the content of more than one discipline, commonly securing two license endorsements for different subject areas while also earning specialized middle-level certifications. An important structural component of interdisciplinary instruction is the support provided by an interdisciplinary team (Manning & Bucher,

2012; Powell, 2011). An interdisciplinary team is comprised of four or five teachers who work with 125 to 150 students, and attempt to create, essentially, a learning environment where a small “school” is housed within a larger school (all 125 to 150 students on a respective interdisciplinary team would study with the same four or five teachers for all core subjects). In the interdisciplinary team, there is typically one teacher with deep subject-area expertise for each of the core subject areas (i.e., language arts, social studies, science, and mathematics). In some interdisciplinary models, additional teachers may be included who teach elective courses.

Interdisciplinary teaching is posited to help students understand the connections between and among subjects (Canady & Rettig, 1995; Wilcox & Angelis, 2012). In middle school settings specifically, the practice is also hypothesized to better address the social needs of early adolescents. However, student acquisition of subject-area knowledge may be compromised in the specific subject in which the dual-licensed teacher does not have deep subject-area expertise (Ali & Heck, 2012).

Interdisciplinary versus Departmentalized Instruction

The majority of middle schools in the United States (US) are still organized departmentally, with individual courses taught separately by single-licensed teachers. In a national survey of randomly selected ($n = 827$) middle schools in the US, McEwin and Greene (2010) reported that 72% of schools indicated that separately taught departmentalized courses was the most common model used at their schools, while the percentage of schools that reported that interdisciplinary instruction within a flexible block schedule was the most common model was 14%. McEwin and Greene noted that the percentage of schools reporting the use of interdisciplinary teaching methods within a

flexible block schedule in their 2010 study had decreased 19% since their previous 1983 study (McEwin & Greene, 1983). This decline may have resulted from an attempt by school leaders to create more academically-focused middle schools in response to an increased emphasis on high-stakes testing and public reporting of student achievement data (McEwin & Greene, 2010; Vars, 2001).

Although studies have been conducted acknowledging the importance of addressing student outcomes in both departmentalized and interdisciplinary middle-level structures (Arhar, 1990; Mac Iver & Epstein, 1992; Mac Iver & Epstein, 1993), these studies have focused primarily on attempting to build theory around various types of school factors that might have an influence on student outcomes. Factors that have been addressed include changing attendance patterns, improving student attitudes toward school, and improving student behavior (e.g., reducing discipline referrals). Much of this research has relied on educator interviews and surveys on which to develop hypotheses. In terms of research studies that have used experiments or quasi-experiments to draw conclusions about the impact of interdisciplinary or departmentalized structures on student learning outcomes, very little research has been conducted (Ali & Heck, 2012).

Language Arts and Social Studies Interdisciplinary Instruction

One of the most common interdisciplinary approaches at the middle-school level combines instruction in language arts and social studies. Because reading skills are central to academic achievement in other content areas (Biancarosa & Snow, 2004), 45 minutes of the middle-level language arts curriculum is frequently paired with another subject area to create an interdisciplinary block. A common choice for the second paired subject is social studies. Thus, 45 minutes of language arts is often coupled with 45

minutes of social studies content to create a flexible 90-minute block of interdisciplinary instruction. When language arts and social studies are integrated, the amount of continuous time that students are given to learn without disruption (having to switch to another class with a different teacher) changes from 45 minutes to 90 minutes (Romano & Georgiady, 1994). It is important to understand that no time is added to the daily schedule, nor to the amount of instructional time students would be expected to receive, on average, in either language arts or social studies. How instructional time is used, however, is organized very differently.

Combining language arts and social studies instruction into a back-to-back double period structure creates a strategically formed language arts/social studies (LA/SS) block. The LA/SS block permits teachers to deliver social studies instruction, and simultaneously use social studies content to teach and reinforce the language arts curriculum. For example, while studying the U.S. Revolutionary War in social studies, students could read a personal narrative from the time period, and also work on their language arts writing standards by completing essay assignments about the same historical event. This is difficult to do in a departmentalized structure because social studies teachers are not integrating language arts standards into their curriculum. As a result, language arts instruction and skill reinforcement (reading comprehension skills and grammar) are taught over two subject areas, instead of one (Manning & Butcher, 2012; Powell, 2011). The licensed language arts teacher is also the licensed social studies teacher and may, therefore, be able to incorporate literacy development into the social studies lesson plans, without reducing the quality of social studies instruction (Canady & Rettig, 1995).

This approach allows teachers to flex time, as needed, and incorporate additional language arts instruction within a social studies content framework. Therefore, language arts reinforcement opportunities for students enrolled in a LA/SS block may be more frequent than for students enrolled in separate language arts and social studies courses, with two different licensed teachers (Canady & Rettig, 1995; Romano & Georgiady, 1994). This is because the LA/SS teacher can continually teach and reinforce reading and writing over a 90-minute period because they would have completed the state-required testing or coursework to earn dual endorsements. In a departmentalized schedule, the social studies teacher would focus solely on social studies content, and would not address reading comprehension skills or grammar skills. For one thing, it is unlikely they would have completed the state-required testing or coursework to do so.

Reading Achievement Remains Low in the US

Researchers have speculated during the middle grades about the significant downturn in indicators of student learning and motivation (e.g., decline in end-of-course grades, attitudes toward school and attendance rates) during the middle grades (Anderman, Maehr, & Midgley, 1999; Carnegie Council on Adolescent Development, 2000). The middle grades are a period of increased turmoil for students and experimentation. For example, absences may increase as middle school students experiment with “cutting classes” or “skipping school.” In addition, according to the data from the 2011 National Assessment of Educational Progress (NAEP) report, one of the most troubling trends among early adolescents is low reading achievement.

The NAEP is the largest nationally representative and continuing assessment targeting what American students know and can do in various subject areas. Assessments

are conducted annually in core subject areas. In the even numbered years, NAEP administers a variety of subject-specific tests to obtain a national estimate of performance. In odd numbered years, NAEP administers only math and reading assessments and obtains state and national estimates of performance in these two key areas. Long-term trend studies are conducted every four years. Because the standardized NAEP assessments are administered uniformly across the nation, NAEP results serve as a common metric for all states and selected urban districts. The assessment stays practically the same from year to year, with only carefully documented alterations. This stability permits NAEP results to be used to provide information on the impact of reform efforts, nationally and longitudinally. Performance data across specific years can be obtained.

As Figure 1 shows, NAEP (2011) reported that eighth-grade average scale reading scores increased nationally only one point (264 to 265 on a 500-point scale) from 1998 to 2011. In Oregon, where the current study was conducted, eighth-grade average scale reading scores actually decreased by two points (266 to 264) from 1998 to 2011 (United States Department of Education, 2011).

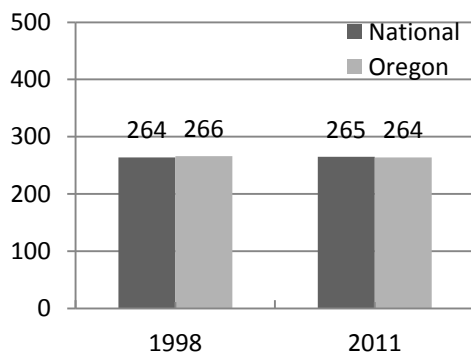


Figure 1. NAEP Average Scale Scores for Eighth Grade Reading from 1998 and 2011.

Transfer of Learning

One way to improve reading outcomes is to make language arts content more relevant to middle-level students by tapping into what students already know and can do. When teachers can guide students to connect (i.e., transfer) new learning content to their prior knowledge and build upon it, new learning, new skills, and new learning applications are more likely to occur. In his book, *How the Brain Learns*, Sousa (2011) suggests learning may occur more easily in classrooms where transfer is an integral component of the teaching and learning process. For example, when students learn to transfer what they learn in the classroom to their everyday life, it increases the probability that they will be good communicators, informed citizens, critical thinkers, and problem solvers.

Similarly, integrating knowledge content-area subjects such as social studies (learning dates, historical events and figures) within more skill-based subjects such as language arts (applying rules of grammar, learning how to comprehend and retain text, and understanding the process of writing as a means to communicate ideas) can be effective because students are able to make curricular connections and transfer skills and knowledge across these two particular subject areas (Johnson & Janisch, 1998; McEwin & Greene, 2010; Romano & Georgiady, 1994). Students who are not able to make meaningful connections across subject areas may be less likely to use their skills to solve problems and draw conclusions in their personal lives (Lipson, Valencia, Wixson & Peters, 1993). In a definitional sense, transfer of learning is theorized to occur when learning in one context enhances learning in another context (Perkins & Salomon, 1992; Salomon & Perkins, 1984). Salomon & Perkins (1984) suggest that two important types

of transfer that occur in the context of classroom teaching and learning include reflexive transfer and mindful transfer.

Reflexive Transfer. Reflexive transfer occurs when stimulus conditions in the transfer context are similar to the conditions in a prior learning context (Perkins & Salomon, 1992; Salomon & Perkins, 1984). When a student learns to write, he or she has the opportunity to transfer or use those communicate skills into other curriculum areas. For example, seventh grade students should be able to more easily learn to write short reports in a lab science class using the process and format they learned in language arts for expository essay writing. Reflexive transfer is semi-automatic. A student can accomplish this type of transfer without too much planning; it should occur naturally.

Mindful Transfer. Mindful transfer, in contrast, involves a deliberate attempt to search for abstract principles among seemingly disparate concepts or events, and a (mindful) search for connections between or among these ideas or events. It demands time for exploration and the investment of mental effort (Perkins & Salomon, 1992; Salomon & Perkins, 1984). For example, students in a language arts class might be asked to make a connection between the central theme of man's inhumanity to man in John Steinbeck's *The Grapes of Wrath*, and the same theme discussed in social studies while learning about The Civil War. Because comparing a novel set during the Great Depression and a war fought some eighty years prior is an abstract idea, reflexive transfer would not be expected to occur on its own, and would thus require mindful and deliberate transfer of learning.

Transfer as a Teaching Tool. Transfer can become a deliberate teaching tool when instruction is designed to foster the conditions needed for reflexive and mindful

transfer (Perkins & Salomon, 1988). Two techniques teachers can use to create the conditions for transfer are referred to hugging and bridging (1988). Instruction that incorporates the realistic experiential concept of hugging and the thoughtful analytic concept of bridging is the most likely to yield rich transfer (Perkins & Salomon, 1992).

Hugging. Hugging is a technique used for reflexive transfer and represents an obvious transfer of two themes (Perkins & Salomon, 1988). Hugging uses similarities between themes to make a new learning experience more like future situations to which transfer is desired. This is an easier form of transfer and relies on a semi-automatic response from the learner when the new situation is encountered. For example, in their language arts class, students would learn strategies for reading informational text. Then, during their social studies class, they could use this skill set to read Benjamin Franklin's Poor Richard's Almanac to learn about the colonial history of the US. Students are given a clear path to the transfer of learning and are guided to “hug” the two learning situations together during the same class period.

Bridging. Bridging, in contrast to hugging, is used to make more mindful learning transfers (1988). In these contexts, teachers would not expect students to make immediate and automatic transfers of knowledge, but rather would provoke them to make explicit connections between two or more less obvious themes. For example, students may be asked to read in language arts Jeanne Wakatsuki Houston's World War II (WWII) novel, Farewell to Manzanar. Then, during a social studies class, they could consider the question, “How was the treatment of Japanese Americans during WWII similar to the treatment of blacks in South Africa during the 1980s?” In this example of transfer, in which the two themes or events are not connected in a clear and obvious way, students

bridge their knowledge of societal standards of the 1940s to their knowledge of South African apartheid that was featured prominently in world events some forty years later.

Transfer in the Interdisciplinary Classroom

Language arts and social studies interdisciplinary teaching is a practice that may maximize the value of transfer because the two subjects are integrated every class period (Canady & Rettig, 1995). In a combined LA/SS class, the social studies content may be used to create language arts lessons. This bridging of the social studies and language arts curriculum creates opportunities for metacognition, as students think through the abstractions created by the combined themes on a daily basis. In separate language arts and social studies classes, the creation of these opportunities must come about in some other manner (Perkins & Salomon, 1992).

If the middle school curriculum is integrated so that young adolescents can see relationships and transfer knowledge between and among disciplines and domains, they can explore issues and problems that are important to them (Manning & Bucher, 2012). This may be best achieved through an interdisciplinary approach to middle-level education. In this model, teachers work together in teams to integrate curricula among all periods. In a departmentalized structure, teachers from the different subject areas do not typically meet on a regular basis to discuss and integrate curricula.

Because the LA/SS block takes advantage of the available connections between two subject areas and facilitates students' ability to transfer what they learn, it is arguably important to have the same teacher teach both areas, preferably during one, two-period block (Beane, 1993). This middle grades approach of blocking periods together is used in LA/SS more often than any other combination of subject areas because social studies

topics and content can naturally be *hugged* with language arts skill development through reading and writing activities (Johnson & Janisch, 1998; Papai, 2000; Weilbacher, 2001). Another, less frequent example of middle school interdisciplinary blocking, is the combination of mathematics and science courses.

Transfer in the Single-subject Classroom

A single-subject classroom, such as social studies, could also incorporate the transfer principles of *hugging* and *bridging*. Pescatore (2008) speculated that when students are given reading material in a social studies class they are able to interact with the text by analyzing the message, compare that message with their current knowledge, consider alternate viewpoints, and synthesize the information gained into a richer knowledge base. Asking social studies students to bridge current themes with previous themes requires an abstract thinking. Pescatore (2008) suggested that an example of this would be studying the effects of Hurricane Katrina and then asking students to review the global warming policies of the previous two US Presidents to draw possible connections or conclusions.

Single-subject language arts teachers could also hug the language arts and social studies curriculum together by using current events as prompts for writing assignments. Students could use what they already know about local or world events to develop and practice writing skills. This would not require an interdisciplinary structure or any flexing of classroom time by the language arts teacher.

Stevens (2003) suggests, however, that a departmentalized middle school structure may create seemingly arbitrary distinctions among subjects, as single-subject teachers may, on occasion, attempt to integrate curriculum with another subject area that

is not a daily part of the curriculum planning. A bridging question in a single-subject classroom may get lost amidst the emphasis on topic-specific, fact-based questions and activities, as single-subject teachers focus on only one content area with no expectation of daily integration with another subject area (Perkins & Salomon, 1988). This fragmentation of curriculum and student learning may make learning less relevant to the life of a middle-level student at a time when early adolescents are becoming interested in how knowledge and skills relate to them (Stevens, 2003).

Flexible Interdisciplinary Block Scheduling

During a developmental period when early adolescents are becoming more adept at transferring knowledge from one curriculum area to another and comprehending abstract connections between and among themes, the structure of the school schedule should adapt to meet these needs. The structure of the daily schedule may influence the degree to which teachers can respond to the instructional and developmental needs of their students (Williamson, 1998). The type of schedule that may best enable schools to address the importance of transfer between subjects is known as *flexible interdisciplinary block scheduling* (FIBS), the restructuring of resources by optimizing time, space and staff while facilitating varied curriculum offerings and teaching strategies (Canady & Rettig, 1995). For example, in a typical FIBS structure, one dual-certified teacher teaches the same group of students two related subjects, blocked together in the school schedule, back-to-back. On average, the same amount of time is devoted to each subject. The two, 45-minute periods are merely combined into one 90-minute block period. This flexible scheduling pattern across disciplines may better address the need for more appropriate learning environments for early adolescents than a traditional schedule. FIBS

responds to this need not by changing the amount of classroom time devoted to specific subjects, but by being more flexible and creative in the use of existing time (Spear, 1992). It could be argued that a departmentalized teacher could also reorganize a 45-minute period to use time more efficiently (Pescatore, 2008). Yet, the bulk of research evidence using qualitative and mixed-methods designs suggests that when the structure of existing classroom time is reorganized so that learning is extended without disruption (two separate 45-minute periods reorganized to a single 90-minute block period), student-teacher relationships may be strengthened, teachers can maximize instructional opportunities, and teachers are more likely to use instructional time more efficiently (Canady & Rettig, 1995; Hackmann, 2002; Manning & Bucher, 2012; McEwin & Greene, 2010).

Qualitative research conducted by Weilbacher (2001) using teacher and student surveys, hypothesized that stronger teacher-student relationships were formed and that learning was more relevant to students' lives as a result of a FIBS. Better teacher-student relationships can be considered a positive outcome of FIBS implementation, because teacher-student relationships must be formed before learning occurs (Sousa, 2011). In a mixed methods study of middle schools ($n = 16$) using a quantitative regression analysis and a qualitative case study method, Wilcox and Angelis (2012) studied the relation between student achievement levels and school characteristics. The study reported that ten high-performing middle schools (designated as *Schools to Watch* or *Breakthrough Schools*) attributed their success to strong teacher relationships that were formed through a collaborative, interdisciplinary structure with a flexible scheduling pattern. In contrast, teachers in six low- to average-performing middle schools (not

designated as *Schools to Watch* or *Breakthrough Schools*) reported feeling “left alone to figure out what to do” (p. 43) as a result of departmentalized, non-collaborative cultures. They referred to their practice as “individual rather than shared” (p. 43). It was also revealed that the teachers in the schools identified as low- to average-performing had only intermittent discussions of curriculum, assessment and student performance in interdisciplinary teacher teams because of their more departmentalized school structure.

In a national study of middle schools ($n = 14,107$), Hackmann et al. (2002) reported that 79% of schools partially or fully implemented some sort of interdisciplinary teaching, where teachers of different disciplines worked together to plan and/or jointly deliver content. However, only 42% of those schools implemented some type of FIBS, where the actual structure of the school schedule supported an interdisciplinary approach to instruction. It could be surmised that the non-FIBS schools (the other 37%) supported and encouraged interdisciplinary discussions, but students were not scheduled into back-to-back classes (e.g., LA/SS back-to-back classes, math/science back-to-back classes) that would have allowed teachers to flex time and extend a particular subject’s curriculum or learning activities, when needed.

National Recommendations for the Use of FIBS

Powell (2011) suggested that educators should begin to view time as a valuable resource rather than an element of schooling to be managed. From her perspective, the school schedule should be an evolving and moldable structure from week to week, semester to semester, and year to year, and that teachers should be encouraged to flex classroom time, when needed, to meet the learning needs of their students.

This We Believe. The landmark position paper of the Association for Middle Level Education (AMLE), formerly the National Middle School Association, is titled, *This We Believe* (2010). AMLE's vision for a successful school for 10- to 15-year-olds is delineated in 16 tenets of successful middle-level education. One of these tenets calls for flexible scheduling and staffing, with interdisciplinary teams of teachers designing and operating much of the program. The AMLE defines FIBS as a way to use the existing time in the school day to match the instructional format to the learning needs of students. These flexible school schedules shift from a series of fixed-time (e.g., 45 minutes) instructional periods each day toward longer instructional periods (e.g., 90 minutes) characterized by interdisciplinary team teaching (blocking) and activities (e.g., written summative assessments that may take longer than 45 minutes to administer) (Bevevino, Snodgrass, Adams, & Dengel, 1999; NMSA, 2010).

The AMLE offers support for the use of FIBS, citing George and Shewey's (1994) report of a large-scale qualitative survey of middle school administrators of 108 exemplary middle schools. The survey asked the administrators to respond to questions regarding the implementation of middle school concepts, including flexible scheduling. Of the respondents, 75% indicated that some form of flexible scheduling was implemented at their school to support interdisciplinary classes. George and Shewey suggested that this practice led to increased academic achievement, based on a comparison of students' end-of-course grades.

In an article published by the AMLE in support of *This We Believe*, Daniel (2007) reported that studies at the middle level investigating the effects of flexible scheduling on student performance outcomes (e.g., academic achievement) are relatively limited. In one

of the few studies that did include student performance outcomes, Lewis et al. (2003), examined the academic achievement of middle-level students in schools that implemented either traditional or flexible block schedules across two studies that used a matched sampling design. The first study used standardized test scores in science as the outcome and the second study used standardized test scores in language arts as the outcome to examine the effect of the school schedule on academic achievement. In both studies, the students in schools that implemented flexible block schedules to accommodate interdisciplinary structures had higher test scores and higher end-of-course grades than students in schools that implemented traditional schedules, accommodating a departmentalized approach.

Turning Points. Another nationally-recognized report was issued by The Carnegie Corporation of New York in 1989. Turning Points was the corporation's landmark report that emphasized the need to strengthen the academic core of middle schools by establishing caring and supportive environments that value adolescents in an attempt to increase academic achievement. The report summarized ten years of interview data collected from middle schools by a taskforce. As a result, Turning Points called for teachers to have the power to create flexible interdisciplinary blocks of instructional time to best meet the needs of students, rather than tailoring the learning to fit a traditional, departmentalized schedule. The 2000 revision of Turning Points echoed this point by recommending that teachers be able to lengthen and shorten class periods (e.g., FIBS) within the available time structure to best reflect instructional and student needs (Jackson & Davis, 2000).

Felner et al. (1997) sought to “assess and evaluate the process of implementation of the recommendations of *Turning Points* for middle grades reform, as well as their impact on student achievement” (p.42) by studying more than 25,000 students in 52 schools over a six-year period. The results of this longitudinal study indicated that across core subject areas, students in schools where the recommendations of *Turning Points* were strongly implemented had higher achievement, as measured by the Iowa Test of Basic Skills and the California Test of Basic Skills, than students in schools where implementation was not strong. Specifically, there was a strong correlation between increasing levels of *Turning Points* implementation and reading achievement as measured by state standardized tests.

A Paradigm Shift from Traditional Scheduling May Be Needed

Reports like *This We Believe* and *Turning Points* recommend that educators select a schedule structure that best meets the needs of adolescents. Both reports recommended a FIBS as a way to do this. Offering a similar recommendation, Hackmann and Valentine (1998) provided six building blocks that support a flexible block schedule approach to scheduling. The schedule should support: (a) interdisciplinary team organization, (b) an appropriate curriculum, (c) teacher empowerment, (d) student development and supportive relationships, (e) quality teacher collaboration, and (f) quality instruction in the disciplines through the flexible use of time.

Despite consistent recommendations for FIBS, the majority of middle schools in the US remain on a traditional schedule (e.g., 40–50 minutes) that includes six or seven fixed periods a day (Hackman et al., 2002; McEwin & Greene, 2010; Williamson, 1998). However, educators and administrators are increasingly turning their attention to the

manner in which time is designated to various subject areas during the day, seeking a way to organize instruction more effectively, to improve the quality of learning and student performance outcomes (Kruse & Kruse, 1995; Wilcox & Angelis, 2012).

Flexing instructional time from 45-minute departmentalized periods each day to 90-minute interdisciplinary block periods may allow students to experience subject-area learning that is less fragmented and allow for more engagement in project-based learning and interdisciplinary activities. A possible benefit of this type of subject integration may include promoting interdisciplinary skill application and problem-solving, and increased interpersonal relations (Vars, 1993). Within an FIBS, teachers may also be more inclined to make scheduling choices to best need the learning needs of their students.

For example, in a 90-minute block period, the LA/SS teacher has the flexibility to focus an entire 90-minute period on language arts instruction. In this context, on Monday and Tuesday, students could begin reading and discussing Clinton Cox's *Undying Glory: The Story of the Massachusetts 54th Regiment*, the personal narrative of the Massachusetts 54th black Civil War regiment. On Wednesday and Thursday, the teacher could devote the entire block period to teaching the social studies content surrounding the experience of the black man during the Civil War, using examples from the text. On Friday, students could begin and complete an in-class formative writing assessment by creative narratives from the perspective of a black soldier, using the social studies content learned in class. This example illustrates how a teacher might "flex" a 90-minute block and teach two subject areas in an integrated fashion. This type of approach sets the FIBS apart from the instruction that typically occurs in a traditional 45-minute departmentalized approach.

It is important to emphasize that blocked periods do not increase the total amount of instructional time in the week. The amount of time in block periods and traditional periods is the same, but whereas in a traditional class the social studies time will be scheduled for 45 minutes (if teachers do not, on their own, incorporate some other content, such as language arts instruction), in a block class the teacher determines how much time to spend on social studies and how much time to spend on language arts. The idea behind block scheduling is that teachers are in the best position to make these decisions based on the goals of the lesson and the needs of their students. On average, in a block class, the same amount of time during the year could be expected to be paid to actual social studies instruction and language arts instruction, and over the course of an academic year these amounts would be the same in a block schedule school and traditional schedule school. However, the ability and encouragement teachers have to flex existing instructional time into interdisciplinary teaching may lead to increased student achievement in the middle grades (Carnegie Council on Adolescent Development, 1989, 2000; Jackson & Davis, 2000; McEwin & Greene, 2010; NMSA, 2003).

Examining FIBS in an Oregon District

My study was based on the following organizing principles: (a) there is an association between how instructional time is structured and student learning; (b) blocks of continuous interdisciplinary instructional time represent a structural configuration that affects teacher practice; (c) through changes in teacher practice, blocks of continuous interdisciplinary instructional time affect student learning; and (d) changes in student learning will lead to increased student achievement, which will be reflected in improved student performance on standardized tests.

The purpose of this study was to examine whether the use of flexible interdisciplinary block scheduling in middle schools is associated with increases in student reading performance, as measured by the Oregon Assessment of Knowledge and Skills (OAKS). The schedule of how instruction was delivered in social studies and language arts (i.e., in a block schedule or a traditional schedule) served as the independent variable and the dependent variable was student performance on the OAKS.

Extant data from two middle schools in the same school district in the Northwestern region of the US were used to evaluate the impact of the independent variable. In this study, the school that implemented the block schedule is referred to as the treatment group and the school that implemented the traditional schedule is referred to as the control group. The treatment group had their seventh and eighth-grade language arts and social studies classes scheduled into 90-minute flexible interdisciplinary block periods, taught by the same teacher. The block schedule was considered flexible because teachers were encouraged to make choices about how to structure the time available for instruction. The control group had their seventh and eighth-grade language arts and social studies classes scheduled into traditional 45-minute departmentalized periods, taught in separate class periods by two different teachers. The overall amount of time allocated to language arts and social studies instruction within the academic year was the same for both groups. My hypothesis was that students in the treatment group would outperform students in the control group on the OAKS assessment of reading proficiency.

CHAPTER II

REVIEW OF RESEARCH

In this chapter, I review research that investigates the possible impact of a flexible interdisciplinary block schedule (FIBS) on teacher practice and student learning. First, I lay the foundation for a conceptual framework for the need of FIBS in schools. I do this by presenting and explaining historically significant educational reform movements that have addressed the need to flex time within the school day as a means to improve student performance. Second, I investigate the possible relation between time and learning by reviewing seminal research in this area. Third, I review empirical research focused on the impact that FIBS may have on classroom instruction and student achievement. Fourth, I summarize the research surrounding FIBS and draw conclusions based on the findings, which ties directly to my research question.

In Goodlad's (1984) book, *A Place Called School*, he hypothesized that teachers are conditioned by the circumstances of schools and that time is the most precious learning resource teachers have at their disposal. Differences in how teachers use time may create inequities among students in opportunities to learn. As a result of his national survey of students, parents, and teachers ($n = 27,000$) Goodlad suggested that the 45-minute traditional schedule may not meet the individualized learning needs of students. It may not provide adequate amounts of extended periods of time in which to provide individualized instruction, extended work in laboratories, experiential learning situations, remediation, or added enrichment opportunities. Goodlad's recommendation was that educators create a daily schedule that embraces flexible blocks of instructional time.

As a result of his study, Goodlad (1984) speculated that the structuring of time within a school schedule is an important framework for learning. He stated: "I would always choose fewer hours well-used over more hours of engagement with sterile activities. Increasing [time] will, in fact, be counterproductive unless there is, simultaneously, marked improvement in how time is used" (p. 283).

Despite the national recommendations from the 1980s and 1990s to reevaluate the effectiveness of the traditional school schedule (National Commission on Excellence in Education, 1983; Goodlad, 1984; National Education Commission on Time and Learning, 1994), the 45-minute period is still the most commonly used schedule type by middle schools in the US (Canady and Rettig, 1996; Powell, 2011). A possible reason that the traditional 45-minute period has remained the same for over 100 years may be that it was based on an idea presented in 1910 of the *credit unit* (Canady & Rettig, 1996). By definition, the credit unit breaks down into a single 45-minute meeting, on each day in a five day week over a total of 30 weeks per year. Seat time requirements were designed to ensure that students were present for a particular amount of instruction, but the varied pace at which different students learn was not taken into account. The number of seat hours required to complete a course was standardized across schools without regard to an individual student's knowledge and skills about relevant content going into the course (Canady and Rettig, 1996; National Governors Association, 2012).

In writing about time, learning, and school reform, Anderson (2000) hypothesized that the manner in which schools utilize instructional time may directly impact student performance and should constitute a larger focus of school reform efforts in the US. Consequently, to better understand what the proper role of time in school reform should

be, a conceptual framework is presented below that describes key considerations in reform efforts related to interdisciplinary versus departmentalized approaches to middle school instruction. This framework focuses on the creative and flexible use of instructional time as a possible means to increase academic achievement in middle schools.

A Conceptual Framework for Reforming Schools through a Flexible Use of Time

A conceptual framework for the proper role of time in school reform efforts should consider that the 1965 legislation of the original Elementary and Secondary Education Act established the need for high standards and accountability in public education, and a direct result of this law was that a great deal of educational research conducted in the following decades questioned the role that time plays in learning (Gandara, 2000). The theories presented by some of these early researchers forms the basis of the argument that the flexible use of time may create more appropriate learning opportunities for students.

Flexible Modular Scheduling. In the early 1960s, the Oregon educator and leader of the National Association of Secondary School Principals (NASSP), J. Lloyd Trump, urged the Oregon Department of Education (ODE) to reexamine school schedules and consider flexible, blocked periods of time as a means to improve classroom instruction. His approach, Flexible Modular Scheduling (FMS), was the first document to challenge traditional thinking in the US regarding schedules and the use of time in secondary schools as a means to reform and improve the education system (Kienholz, Segall, & Yellin, 2003).

The plan that Trump submitted to the ODE was indicative of the free-spirited sixties and the proposal was to replace traditional class schedules with extended instructional, tutoring, and self-study sessions that lasted up to 120 minutes (Goldman, 1983). Large groups of students (e.g., 100) would progress from session to session based on their mastery of concepts (Goldman, 1983; Gruber & Onwuegbuzie, 2001). Trump's introduction of FMS persuaded many educators, policymakers, and other stakeholders to view the school schedule as an under-utilized resource, and if changed in specific ways, a resource that had the potential to increase student outcomes through more intensified periods of learning (Francka & Lindsey, 1995). Although it was estimated that by the late 1960s approximately 15% of US high Schools had implemented FMS, the plan ultimately failed to take permanent hold. A major barrier to widespread adoption was the large amount of unstructured, independent study time for students and the unfavorable review from teachers (Goldman, 1983).

The Model Schools Project of 1969. In a subsequent attempt to focus educational reform efforts on the flexibility of instructional time, Trump co-authored the Model School Project (MSP), proposing a systemic change in the school learning environment (Keefe & Amenta, 2005). MSP was sponsored by the NASSP and represented the culmination of that era's seminal thinking about school reform efforts (Keefe & Amenta, 2005). This reform model included a differentiated staff of teachers and aides, new roles for teachers and students, individualized student scheduling and evaluation, a non-graded approach to curriculum and instruction, and school resource centers offering students a variety of print and non-print learning materials and activities. Original participants of

the MSP consortium included 36 middle and senior high schools in the United States and Canada, under the direction of the NASSP (Keefe & Amenta, 2005).

The MSP presented a far-reaching and well-coordinated view of education implemented by junior and senior high schools throughout the US and Canada. Implicit in the model was a recognition that students learn at different rates and in unique ways, and that instruction should relate to the actual maturity and readiness of the learner. Thousands of secondary schools in the US and Canada implemented the recommendations of the MSP (i.e., team teaching and flexible scheduling).

The school schedule was an integral focus of the MSP, and its authors believed that encouraging a flexible approach to school scheduling would lead to greater student outcomes. However, while the MSP sponsored a considerable amount of formative evaluation on current practices of that era, it did not provide the education community and the public the kind of assurance that might have institutionalized the concepts: data on student performance outcomes (Keefe & Amenta, 2005). As a result, the MSP did not achieve its desired goal of fundamentally changing secondary education in the US.

A Nation at Risk. How students spend their time in school became a popular topic again in 1983 following the release of the National Commission of Excellence in Education's (NCEE) *A Nation at Risk* (Karweit, 1989). The report recommended extending the school year from 180 days to 200 or 220 days, and lengthening the school day from five or six hours to eleven (NCEE, 1983). Although this report generated a great deal of legislative discussion on the topic of school time, beyond a review of the use of time in the school calendar, few significant results stemmed from this recommendation (Gabrieli & Goldstein, 2008; Karweit, 1989).

In fact, since the report was issued in 1983, the nation has seen a large increase in public spending on education and a steady parade of educational reform ideas not directly linked to this national report, including: state academic standards, smaller class sizes, computers in the classroom, charter schools, school-based management, smaller learning communities, and high-stakes testing. Yet, very little energy has been spent on the recommendation of flexing instructional time within a school day to better meet instructional goals (Gabrieli & Goldstein, 2008). Although education spending on national reform efforts doubled in real dollars from 1975 to 2002, there was little improvement in learning, as measured by performance on the NAEP, for example (Gabrieli & Goldstein, 2008).

Prisoners of Time. In 1994, the National Education Commission on Time and Learning (NECTL) released its report, *Prisoners of Time*, stating that, “Learning in America is a prisoner of time. For the past 150 years, American public schools have held time constant and let learning vary” (p. 5). The report asserted that schools nationwide ran on a fixed schedule and this problem created educational inequalities by not recognizing students as individual learners. The commission suggested that the nation should reinvent schools around learning, not time, and fix what it saw as a fundamental design flaw. Its recommendation was to flex instructional time in new and better ways (National Education Commission on Time and Learning, 1994).

The NECTL report challenged educators to reevaluate the way time was allocated and used for educational purposes. Higher standards and a more flexible use of time within the school day were recommended to create a reform agenda that could work. The report stated, “With standards as our compass, time can be the rudder of reform” (p. 29).

This report presented the argument that if higher standards were implemented as part of a reform agenda, then how time is used should become a flexible resource. But instead, as additional reform agendas came and went, so did this recommendation on the flexible and creative use of time in a school schedule as a significant means of educational reform.

In a later perspective on the use of time in schools, Levine (1997) suggested that schools, and the people who work in and with schools, have their own particular ways of remaining *prisoners of time*. The author affirmed that time and learning are intimately related and should play significant roles in educational reform efforts. He advocated that more time focused on creative and critical thinking is essential, but suggested that simply lengthening the school year without expanding and making flexible the time within the school day may result in little to no gains. Levine also suggested that teachers and students need enough time within a class period to delve deeply into areas of interest and what is taught needs to be known in depth. In this way, the amount of time in a class period and the quality of instruction that could be provided are inextricably related.

The Relation Between Time and Learning

Gandara (2000) wrote that although there is an obvious relation between the amount of time invested in learning and the amount learned by the student, the relation between the structure of existing time and student achievement is not always linear. The reason for this is that time may take on different forms in different instructional contexts. According to Gandara, these different types of time can be categorized as allocated time, engaged time, time on task, and academic learning time.

Allotted time is the amount of time designated for the task at hand. Engaged time is the amount of time students are actually doing the task at hand. Time on task is the

amount of engaged time actually spent on the learning objective, and academic learning time is the time spent successfully learning the objective (Karweit, 1989; Berliner, 1990; Gandara, 2000). Of these four categories of time, my study focused on allotted time and its relation to learning outcomes. The causal relation between allotted time and learning outcomes is relatively weak; simply giving students more time to complete an objective will not necessarily result in more learning. However, the correlation between the amount of continuous, uninterrupted blocks of time on task and learning outcomes is much stronger (2000). Thus, it can be surmised that adding instructional time is not necessarily needed in the school day; however, structuring the amount of allotted time into larger blocks of time instead of short fragmented periods may result in better learning outcomes for students. Gandara suggested that the one variable that is often overlooked in the discussion of the effects of time on learning is the concept of how much time is actually needed for learning.

Seminal Research on Time and Learning: Model of School Learning

In 1963, John B. Carroll addressed the question of how much time is actually needed for learning in his Model of School Learning (MSL). He proposed that learning is a function of the amount of time required to learn something, divided by the amount of time allotted for instruction (Carroll, 1963).

The MSL, as presented by Carroll in 1963, presented five basic classes of variables that arguably accounted for variations in school achievement: (a) aptitude, (b) opportunity, (c) perseverance, (d) quality of instruction, and (d) ability to understand instruction. In a 25-year retrospective article, Carroll (1989) wrote, “time in learning (is) an exceedingly obvious variable that must have been in the minds of educators over the

centuries and that has figured heavily in the work of theorists and experimenters on learning ... we can say with some certainty that any learning that happens to occur does require time” (p. 27).

Carroll (1963, 1989) explained that three of the five basic classes of variables that account for the variations in school achievement specifically address the use of time: (a) aptitude is the amount of time a student needs to learn a given task, (b) opportunity to learn is the amount of time in the school schedule allotted for learning, and (c) perseverance is the amount of time a student spends on learning. Carroll’s theory of learning focused on the type of academic achievement typically measured by standardized achievement tests or end-of-course grades.

Carroll (1989) defined aptitude as the amount of time a student needs to learn a given task, unit of instruction, or curriculum to an acceptable criterion of mastery under optimal conditions of instruction and student motivation. Carroll suggested that if a student were given the amount of time needed to complete the task at hand and if the student persevered, devoting this amount of time to the task, the student would successfully meet the learning goal. This is perhaps the most influential variable in the MSL. Carroll views students as learners capable of desirable levels of academic achievement if provided the right structure of time and the correct quality of instruction.

Carroll's Influence on Bloom's Mastery Learning Model. This temporal interpretation of aptitude has influenced many educational reformers through the past decades, including Benjamin Bloom (Reeves, 1996). Bloom (1974) suggested that using time as a variable in educational research is a very attractive feature because time can be measured with as much precision as the researcher desires. He also asserted:

In setting time as the central variable in school learning, Carroll produced a major shift in our thinking about education and educational research. If teachers and curriculum makers can define an appropriate criterion of achievement, then it becomes the responsibility of the teachers and the schools to provide the time necessary for the students to attain the criterion. (p. 683)

McIlrath and Huitt (1995) suggested that the principles of the Carroll model can be seen in Bloom's (1977) Mastery Learning Model (MLM). The researchers wrote that Bloom, a colleague of Carroll's, observed that in traditional schooling a student's aptitude for learning academic material is one of the best predictors of school achievement. Bloom (1977) believed that 90% of students can learn what is normally taught in schools at an "A" level if time were structured appropriately to enable the demonstration of mastery of objectives and teachers delivered appropriate instruction. Carroll (1963, 1989) theorized that a major weakness of most school schedules is that they do not provide an opportunity to flex allotted time for students with lower aptitudes to demonstrate a mastery of objectives. Time is commonly structured into short, fragmented periods of teaching and learning that the classroom teacher cannot alter.

Carroll's Influence on Modern-Day Reform Efforts. Anderson (2000) explained that most modern educational reform efforts pertaining to time generally focus

on increasing students' opportunity to learn, such as longer school days or lengthened academic years. Carroll (1963), however, argued that if a student is fully able to understand the material being presented, no additional time will be required beyond that determined by the student's aptitude. It is only when a student is not able to understand the material being presented that a flexible time structure will be required to match the student's aptitude. The total amount of time needed to learn, then, is relative to the student's aptitude, adjusted as necessary for the discrepancy between the student's ability to understand instruction and the quality of the instruction provided (Anderson, 2000). Part of the brilliance of the Carroll model was how it moved out of the realm of the abstract into the arena of empirically testable ideas by defining factors in terms of time needed for learning (2000).

Empirical Research that Tested the Model of School Learning. An experiment conducted by Millman, Bieger, Klag, and Pine (1983) tested a deduction of Carroll's (1963) MSL model. The researchers claimed that the model, if correct, had immense significance for instruction in schools. According to Carroll, if a learner is willing to persevere to the extent needed for learning, increasing the learner's perseverance through the use of encouragement or rewards will not increase the level of learning. Carroll's formulation implies that if a student is given enough time to complete a task (the numerator in his formula) and the amount of time needed to learn the task remains smaller (the denominator in his formula), then a high degree of learning (mastery) will occur. However, the third factor in his model, perseverance (the amount of time that the student is willing to spend on the task), is also at play in this formula.

Carroll asserted that if the learner is already willing to persevere the amount of time needed to learn, then increasing the perseverance will not alter the degree of learning. In other words, if a student has been given enough time to complete a learning objective and has an aptitude that requires less time to learn the objective than is given, then increasing the learner's perseverance through the use of encouragement or rewards will not shorten the amount of learning time. According to the MSL, it would remain the same. This is significant in terms of my study because Carroll suggested that flexing time to accommodate a student's aptitude for learning academic material is simply all that is needed to achieve the learning.

Millman, Bieger, Klag, and Pine (1983) designed an experiment to test this assertion. The study met these conditions: (a) the treatment and comparison groups were equal in aptitude for the chosen learning task and were each provided with the same quantity of instruction, and (b) all subjects showed sufficient perseverance to learn the task in the amount of time needed to match student aptitude.

The researchers conducted four separate experiments to test Carroll's theory. In each experiment, students were asked to memorize lists of paired words. Students were randomly assigned to one of three conditions: highly encouraged to do well, moderately encouraged, and not encouraged at all. The first study included 48 elementary students who were asked to participate in learning tasks outside their usual class assignments. The second study included 36 entry-level college students who volunteered for the study with no type of compensation or reward. The third study included 48 entry-level college students who were offered bonus points toward their final grade for participating. The

fourth study consisted of 48 entry-level college psychology students who were offered course credit for their participation.

The results of all four experiments were similar, with no statistically significant differences found in mean learning time between students encouraged to persevere and those not encouraged (Millman, Bieger, Klag, & Pine, 1983). Carroll's model was supported because according to the MSL, considerations such as encouraging students to persevere or work harder did not factor into the results. In other words, the encouragement to persevere did not affect the outcome. The critical variables were the students having enough time and the aptitude to complete the task.

Process-Product Research and Its Relation to MSL. Much like Carroll's MSL, the quantitative findings of Process-Product Research (PPR) of the 1970s and 1980s linked achievement gains to students' opportunity to learn the material and, in particular, to the amount of instructional time that students receive from their teachers. Academic learning is influenced by the amount of time that students spend engaged in academic activities (Brophy, 1988). PPR suggested that when more content is covered, there is a greater opportunity to learn. There is, however, an assumption that "the time devoted to the topic and the quality of the instruction is sufficient to ensure that students will master the content if they put forth reasonable effort" (p. 240). The opportunity to learn is defined as the length of the school day (allocated time), determining the total amount of time that is available for learning. Karweit (1985) suggests that the amount of this available time is only indirectly related to student achievement. How the available time is actually structured and used by the classroom teacher directly determines how much and how well a student will learn a given set of material (Carroll, 1963; Karweit, 1985).

Larger Blocks of Allotted Time: Effects on Instruction and Student Learning

Carroll (1990) suggested that traditional, short, daily instructional periods leave students feeling overwhelmed by multiple academic lessons and homework assignments, varied behavioral expectations, disconnected curricula, and does not meet the needs of individual aptitudes in relation to the learning objective. Restructuring the allotted time into larger flexible blocked periods, allows students to concentrate on three or four periods each day, rather than seven or eight. The restructuring of the school day, using a flexible schedule, could result in more time on task than is found with a traditional 45-minute period. This is because the allotted time is flexed into longer blocks of uninterrupted teaching and learning. In contrast, a traditional 45-minute period provides teachers and students with short, fragmented periods of allotted time, with multiple transitions and no flexibility to extend learning time past the 45 minutes to meet individual student needs.

Veal and Flinders (2001) posited that educational research in the area of flexible block scheduling falls into two categories, instruction and learning. The first category of research investigated the effects of block scheduling on instructional practice and answered the question of how structuring allotted classroom time into a 90-minute block period provided more flexibility and creative opportunities for instruction. To examine the effects of a block schedule on classroom instruction, four studies were reviewed. These studies are summarized in Table 1.

Table 1

Qualitative Studies Examining the Effects of a Block Schedule on Classroom Instruction

Author	Year	Study Sample	Independent Variable(s)	Dependent Measure
Staunton & Adams	1997	106 teachers	Teachers implemented new instructional strategies for a 90-minute block period	Teachers responded to questionnaires about their instructional practices
Shortt & Thayer	1999	164 administrators	Teachers implemented new instructional strategies for a 90-minute block period	Administrators responded to mailed questionnaires about teacher practice
Brown	2001	10 teachers	Teachers implemented new instructional strategies for a 90-minute block period	Teachers responded to interview questions about their instructional practices
Veal & Flinders	2001	77 teachers	Teachers implemented new instructional strategies for a 90-minute block period	Teachers responded to questionnaires about their instructional practices

Staunton and Adams (1997) suggested that each of the 106 California high school teachers in their qualitative study altered their instructional strategies as the result of block schedule implementation. When allotted time was flexed within the school day, moving from eight traditional periods to four alternating block periods, researchers noted a greater emphasis on altering instruction based on student needs and an increased willingness to experiment with different instructional methods. These instructional changes reflected innovative practices that were more easily and willingly implemented when allotted time was flexed into a 90-minute period, such as extended small group learning opportunities and more individualized (one-on-one) instruction. This study did not provide any data from a comparison group or alternative hypotheses.

Shortt and Thayer (1999) studied the perceptions of 164 high school administrators on the impact of block scheduling. Principals ($n = 164$) responded to mailed questionnaires that addressed their perceptions of how block scheduling may have changed the instructional methods of their teaching staff. The results of the study hypothesized that the “greatest asset” (p. 78) of block scheduling was the flexibility [of teachers] to use time to meet the needs of at-risk students who were neither prepared nor willing to function successfully in the traditional (e.g., 45-minute period) school setting. The authors speculated that this may have been because within a 90-minute period, students were provided with more opportunities for individualized instruction. The authors also noted that the questionnaire data were not a definitive measure of the effectiveness of using a block schedule to improve the learning climate in a school and that student achievement should be measured over a longer period time using standardized measures.

Veal and Flinders (2001) conducted a high school study in the Midwestern US using qualitative methods and a sample of 77 teachers. The study used questionnaires to determine how time, when scheduled into 90-minute blocks rather than 45-minute periods, altered instructional planning to accommodate a block schedule. The results of the study indicated that larger blocks of continuous, uninterrupted instructional time were an impetus for changes that included (a) greater variety in the use of instructional methods, (b) more frequent use of individualized instruction, and (c) increased implementation of small-group activities.

Veal and Flinders (2001) noted that the increase in the variety of instructional methods was the most common instructional change noted by block schedule teachers.

The questionnaire responses suggested that teachers were able to deliver content in ways that were not possible within a traditional 45-minute period schedule, such as giving a lecture, utilizing cooperative group learning, and using formative assessments activities all in one (block) period. One English teacher reported, “I quickly discover what is misunderstood because I can take a whole hour, if needed, to thoroughly teach, discuss, review or correct all in one day” (p. 25). This study suggested that a block schedule could be a catalyst for teachers to change their practices and, as a result, may better meet the instructional needs of students.

A qualitative study performed in a school district in the mid-Atlantic region of the US reported similar results. Brown (2001) interviewed ten middle school teachers to measure how their curriculum planning changed when a block schedule was implemented. Brown reported that new instructional strategies were implemented by all ten teachers as a result of the increased amount of continuous, uninterrupted instructional time allowed during a 90-minute block period. These changes included (a) providing more time for individual student participation during whole-class discussions, (b) designing hour-long activities that promoted critical and creative thinking because students were focused for extended amounts of time, and (c) the use of more student-to-student collaborative learning experiences (one-on-one work sessions).

Differences between a FIBS Classroom and a Traditional Classroom.

Research suggests that as the number of classes and teachers a student encounters each day decreases, there is an increase in the development of teacher-student relationships, the identification of student strengths and weaknesses by the teacher, and the use of varied instructional strategies in lesson planning. In their book *The Definitive Middle*

School Guide, middle school educators Forte and Schurr (2002) theorized that a FIBS encourages teachers to use allotted classroom time more constructively, making learning more “active, varied, motivating, and relevant for students” (p. 154). A FIBS classroom is structured differently from a traditional classroom because the allotted time is flexed to create a longer block of time for teaching and learning.

The Effects of Larger Blocks of Allotted Time on Student Learning

In their book *Teaching in the Block: Strategies for Engaging Active Learners*, Canady and Rettig (1996) speculated that more academic content is typically covered when the allotted instructional time is flexed into a block schedule. They also suggested that school schedules that creatively flex allotted time into interdisciplinary blocks will increase the probability of student learning and will ultimately result in higher academic achievement, when measured by standardized tests or end-of-course grades.

According to Veal and Flinders (2001), the second category of research in the area of block scheduling has examined the effects of FIBS on student learning and aimed to answer the question of how structuring allotted classroom time into a 90-minute period increased the probability of student learning. To examine the impact of a flexible block schedule on student learning, nine studies were reviewed. These studies are summarized in Table 2.

Table 2

Studies Examining the Effects of a Block Schedule on Student Learning

Author	Year	Study Sample	Independent Variables	Design	Dependent Measurement
Lee & Smith	1993	8,845 students	Core subject (English, math, social studies, and science) instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Quantitative	National Longitudinal Study data were collected
Alspaugh & Harting	1998	3 groups of 10 middle schools	Core subject instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Quantitative	Students completed standardized assessment tests
Deuel	1999	49,829 students & 130 teachers	Core subject instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Mixed methods	Students earned end-of-course grades in core subjects and teachers answered questionnaires about how students used their time during the block period
DiRocco	1999	1 middle school	Core subject instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Quantitative	Students earned end-of-course grades and completed state assessment tests

Table 2

Studies Examining the Effects of a Block Schedule on Student Learning (Continued)

Author	Year	Study Sample	Independent Variables	Design	Dependent Measurement
Lawrence & McPherson	2000	4,759 students	Core subject instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Quantitative	Students earned end-of-course grades
Evans, Tokarczyk, Rice, & McCray	2002	3 high schools	Core subject instruction delivered in a 90-minute block schedule and compared to previous year's 45-minute traditional schedule	Mixed methods	Teachers and parents answered questionnaires about their perceptions of block scheduling, students earned end-of-course grades and completed state assessment tests, and failure rates were compared
Stevens	2003	3,916 students & 49 teachers	Reading and English instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Quantitative	Students completed standardized assessment tests
Lewis, Dugan, Winokur, & Cobb	2005	451 students	Reading instruction delivered in a 90-minute block schedule or in a 45-minute traditional schedule	Quantitative	Students completed standardized assessment tests

Lee and Smith (1993) were among the first researchers to directly study the impact that interdisciplinary instruction in a block schedule may have on student performance outcomes. The sample for this study was drawn from the National Education Longitudinal Study (NLS) of 1988 and included 8,845 middle school students from 377 public, Catholic and independent schools. Their findings reported that schools that implemented interdisciplinary teaching had higher achievement scores and higher levels of student engagement compared to more departmentalized schools, as measured by the NLS. But, because Lee and Smith could not control what or how data were collected, the researchers noted that they were not sure whether the sample of students in schools that reported that they engaged in practices like heterogeneous grouping or interdisciplinary teaming actually structured instruction in that way. They also did not have data on the level of implementation of these practices.

Alsbaugh and Harting (1998) studied the effects of interdisciplinary instruction in a block schedule versus departmentalization on student achievement in their study that used a sample of three groups of ten middle schools. Using the Missouri Mastery and Achievement Tests (MMAT) as their pre- and post-tests, their findings indicated that no statistically significance differences were found for reading achievement on the MMAT in grades six through eight in interdisciplinary versus departmentalized schools. The researchers noted that the small number of available schools limited their sample size and the power of the statistical tests in the comparisons.

DiRocco (1999) studied how block scheduling at a Northeastern middle school may have impacted student learning. Students who received the majority of their instruction in traditional 45-minute periods were compared to students who received the

majority of their instruction in 90-minute block periods. The results of his study revealed that grade point averages and the means of the 8th grade standardized achievement tests in reading, language, mathematics, and social studies were significantly higher for students who received their instruction during 90-minute block periods. When instructional time was flexed from traditional 45-minute periods into 90-minute block periods, the result was higher academic achievement as measured by standardized tests and end-of-course grades.

Results that contrasted with DiRocco's (1999) findings were revealed in a larger-scale study by Deuel (1999) on the impact of block scheduling on student performance outcomes in a large urban Southeastern school district. Participants included students from 23 high schools ($N = 49,829$). Ten self-selected schools implemented a block schedule ($n = 23,248$) and 13 schools maintained a traditional schedule ($n = 26,581$). Using data from student academic records over a two-year period, Deuel used a quasi-experimental pre- and post-test design. The results of Deuel's study showed a significant increase in end-of-course grades at schools that used blocked periods of allotted time compared to schools that used traditional 45-minute schedules. The use of end-of-course grades as an outcome measure was limited due to their subjective nature.

In a comparative study of block scheduling and traditional scheduling on academic achievement, Lawrence and McPherson (2000) studied students from two high schools in the same school district in the Southeastern US. The researchers used the North Carolina End-of-Course Tests to measure the impact of block scheduling on student performance outcomes. The sample consisted of students on a traditional schedule ($n = 2,706$) and students on a newly-implemented block schedule ($n = 2,053$).

The mean scores on the standardized tests for students in a traditional schedule were higher than the mean scores for students on a block schedule in algebra, biology, English and history and revealed significant statistical differences in favor of the traditional [45-minute period] schedule. The higher performance of students in the traditional schedule may have occurred because the block schedule was in its first year of implementation. Shortt and Thayer (1997) suggested that the first year in a block schedule can be demanding and teachers may not cover as much material as they would have in a traditional schedule.

In a mixed-methods study conducted by Evans, Tokarczyk, Rice and McCray (2002), data were collected from three New Jersey high schools in which block scheduling was newly implemented. Student data including end-of-course grades, standardized test scores, and honor roll and failure rates, as well as interview data from teachers and parents, were collected before block scheduling was introduced and used as baseline data. The same data from the same groups of students were collected after one year of block scheduling implementation. Students raised their standardized test scores by an average of 14 points, and the percentage of students passing all three sections of the High School Proficiency Test increased by six percent. Because of the newness of block scheduling in these schools and the short time frame of the study, participants may have performed at a higher level because of the newness and excitement of the implementation of the block schedule.

Stevens (2003) studied the reading and English achievement of 3,916 students in five high-poverty urban middle schools using the California Achievement Test. Separate reading and English classes, taught by two separate teachers were used for instruction in

the 29 control schools. English and reading classes were combined into one interdisciplinary block period, taught by one teacher, in the 20 treatment schools. Pre-test data were collected from the school district records of the California Achievement Test administered in May of each year. The students in the treatment schools had significantly higher achievement scores than students in the control schools on reading comprehension $F(1,158) = 3.95, p < .05$, reading vocabulary $F(1,158) = 4.31, p < .05$, and language expression $F(1,158) = 5.74, p < .05$ as measured by the California Achievement Test administered at the end of the one-year study.

Lewis, Dugan, Winokur and Cobb (2005) used a longitudinal research design to measure the impact of block scheduling (treatment) and traditional scheduling (control) on the reading achievement of secondary students in a Southwestern school district. Students from four junior high schools and three high schools ($n = 355$) were studied over a two-year period. Standardized test scores from the Levels Test and the ACT were used as pre- and post-tests to measure student performance outcomes. The researchers reported slight, but statistically significant gains in reading achievement scores for the treatment group. The findings from this study supported the hypothesis that students in block schedules may do better academically than students in traditional schedules.

Research on FIBS Is Generally Inconclusive

Vars (2001) reported that more than 200 studies have been completed to assess the effectiveness of the various forms of instruction commonly found in block schedules. Unfortunately, few of these studies were true empirical studies that used any sort of standardized assessment to measure student performance outcomes to support that curriculum delivered in a block schedule is any better than a well-designed, subject-

specific curriculum delivered in a 45-minute traditional schedule (Ahern, Czerniak, Sandman, & Weber, 1999; Drake, 2000; Vars, 2001). Lounsbury (2009) speculated that the lack of true empirical studies on middle-level practices (e.g., interdisciplinary instruction and block scheduling) is due to the difficulties that schools experienced (e.g. lack of funding to train teachers appropriately) when trying to implement these types of structures within their daily schedules. In addition, there were also wide variations in the scope and quality of the research that does exist. Studies ranged from highly sophisticated analyses of data on thousands of students to small qualitative studies of students in one classroom or taught by one teacher (Vars, 2001).

There is limited solid research on the effects of interdisciplinary education in a block schedule on student performance outcomes, and the evidence of other benefits of interdisciplinary structures (e.g., increased positive attitude, increased self-concept and motivation, lowered anxiety levels, and increased student cooperation) is also of generally poor quality. Much of this additional evidence is anecdotal and based on qualitative studies using questionnaires or interviews that are limited in how data were collected (Drake, 2000). The difficulties in summarizing the range of evidence is formidable. Nevertheless, Vars (2001) believed the evidence was sufficient to assert the following:

Almost without exception, students in innovative interdisciplinary programs do as well as, and often better than, students in so-called conventional programs. In other words, educators who carefully implement any of the various types of interdisciplinary approaches can be reasonably assured that there will be no

appreciable loss in student learning, except, perhaps, for the temporary "implementation dip" that occurs whenever people try anything new (p. 9). The inconclusive nature of the findings related to the impact of interdisciplinary instruction on student achievement is evident, however, when quantitative studies with reasonable controls is the evidence base considered. Russell (1997) commented on the practice of interdisciplinary instruction by asserting that "unfortunately, this [interdisciplinary instruction] model's impact on the education of early adolescents has not been evaluated thoroughly. Consequently, the relationship of such middle level education models to student achievement, in particular, remains unclear" (p. 169).

Research Question

This review of empirical research on the effectiveness of FIBS and its impact on student performance outcomes revealed that there is still little evidence on how students perform in their classes and on standardized assessments as a result of FIBS implementation. Based on the results of these studies, there is some reason to suggest that students being taught in an FIBS do as well as, or sometimes better than, students in a traditional 45-minute period schedule. The review of research has, at a minimum, suggested that there should be no appreciable loss in students' learning if allotted time was structured into an FIBS. Thus, the primary research question for this study is: What is the relationship between schedule type (put in two groups) and student performance outcomes as measured by the OAKS assessment of reading proficiency?

CHAPTER III

METHODOLOGY

The purpose of my study was to investigate what impact schedule type, defined by the use of a middle school flexible interdisciplinary block schedule (FIBS) versus a traditional 45-minute class schedule, had on student reading performance on the Oregon Assessment of Knowledge and skills (OAKS) Reading assessment. Two schedule types were compared: (a) students at one middle school had a 90-minute middle school FIBS and served as the treatment and (b) students at another middle school had a traditional schedule where language arts and social studies were taught separately and served as the comparison. A repeated-measures ANOVA was used to determine if a statistically significant difference between OAKS Reading assessment scores between these two groups occurred.

Research Design

This study used a quasi-experimental research design to assess the difference in OAKS Reading test performances between the Treatment Group (TG) and Comparison Group (CG). Because the purpose of this study was to examine the relation between scheduling and student performance outcomes, the quantitative research design was the most appropriate (Williams, 2007).

The sixth grade OAKS reading assessment scores were used to establish the baseline for student performance, as this was the year prior to students being placed in the two different schedule types. There was a non-significant effect for sixth grade reading, $t(395) = 592, p = .554$, with the CG mean score of 236.21 (SD = 8.18) being slightly higher than the TG mean score of 235.69 (SD = 9.16). During the seventh and eighth

grade school years, students were either in the TG 90-minute interdisciplinary block or the CG 45-minute traditional periods with no planned interdisciplinary teaching. Students had either the treatment or the comparison schedule type for the full two years and were given the OAKS reading assessment during their seventh and eighth grade years. Even though the students attended two different schools, the textbooks and school district-created reading lists for the language arts classes were identical in both the treatment and the comparison condition. Finally, all students were administered the ninth grade OAKS reading test. Mean reading growth for both groups across time (sixth, seventh, eighth, and ninth) was compared. Table 3 summarizes the two groups.

Table 3

Student Groups Summarized

Group	<i>n</i>	Schedule type	Length & frequency of daily language arts period	# of language arts & social studies teachers
Treatment	208	Flexible interdisciplinary 90-minute blocks	45 minutes integrated with social studies daily	1 integrated language arts and social studies teacher
Comparison	188	Traditional 45-minute periods	45 minutes daily	1 language arts teacher & 1 social studies teacher

Study Participants

Treatment Group (TG). The 208 students in the treatment group attended seventh grade during the 2007-08 academic year and eighth grade during the 2008-09 academic year at the middle school that implemented a FIBS. The treatment group received their seventh- and eighth-grade language arts instruction during a 90-minute

interdisciplinary block period that integrated social studies curriculum as part of the 90-minute period. The language arts/social studies (LA/SS) block met daily, Monday through Friday. The same teacher taught the language arts and social studies courses during the block period, and the language arts and social studies courses were purposefully scheduled back-to-back. The TG contained an equal number of males (n = 104) and females (n = 104). In terms of ethnicity/race, the TG contained Hispanics (n = 4), American Indians or Alaska Natives (n = 4), Asian or Pacific Islanders (n = 25), blacks (n = 4), and whites (n = 171). The TG also contained students identified as talented and gifted (TAG) (n = 46) and limited English proficiency (LEP) (n = 1). The end-of course grades in sixth grade reading for the TG was a mean score of 3.63 (SD = .485). Table 4 summarizes the demographic data in tabular form.

Comparison Group (CG). The 188 students in the CG attended seventh grade during the 2007-08 academic school year and eighth grade during the 2008-09 academic year at the middle school that implemented a traditional departmentalized schedule. The CG received their seventh- and eighth-grade language arts instruction during a traditional 45-minute class period that met daily, Monday through Friday. Language arts curriculum was not integrated with social studies curriculum. One teacher taught the language arts class, a different teacher taught the social studies class, and the two classes were not purposefully scheduled back-to-back. The CG contained more males (n = 101) than females (n = 87). In terms of ethnicity/race, the CG contained Hispanics (n = 4), American Indians or Alaska Natives (n = 1), Asian or Pacific Islanders (n = 10), blacks (n = 1), and whites (n = 172). The CG also contained students identified as TAG (n = 43)

and LEP (n = 1). The end-of course grades in sixth grade reading for the CG had a mean score of 3.40 (SD = .667). Table 4 summarizes the demographic data in tabular form.

Table 4
Demographic Data

	<i>Treatment</i>	<i>Comparison</i>
Gender		
Female	104 (50.0%)	87 (46.3%)
Male	104 (50.0%)	101 (53.7%)
Ethnicity / Race		
Hispanic	4 (1.9%)	4 (2.1%)
American Indian / Alaska Native	4 (1.9%)	1 (.5%)
Asian / Pacific Islander	25 (12.0%)	10 (5.3%)
Black	4 (1.9%)	1 (.5%)
White	174 (83.3%)	174 (92.6%)
Talented and Gifted (TAG)	46 (22.0%)	43 (22.9%)
Limited English Proficiency (LEP)	0 (.0%)	1 (.5%)
Grade Point Average		
Mean	3.63	3.40
Standard Deviation	.485	.667

Initial Group Differences. Chi square tests were used to determine whether there was a significant relationship or difference between the two groups. The demographic variables analyzed were: (a) gender, (b) ethnicity (i.e., Hispanic, not Hispanic) or race (i.e., American Indian or Alaska native, Asian or Pacific Islander, black, or white), (c) involvement in the Talented and Gifted (TAG) program, (d) involvement in the limited

English proficiency (LEP) program, and (e) end-of-course reading grades from the sixth grade year. The socio-economic status variable was not used in this analysis because it was unavailable from the school district due to confidentiality restrictions. A significant relationship between the two variables on the Chi square test would indicate that the variables were not independent of one another, while a non-significant relationship between the variables would indicate that the variables were independent of one another (Babbie, 2012).

Cross-tabulation tables were created for the categorical variables indicating the frequency in which the corresponding categories of the variables occurred together. The results of the Chi square tests conducted on the control variables showed that there was no statistically significant difference between the treatment and comparison groups in terms of gender ($p = .430$), Hispanic ethnicity ($p = 1.000$), American Indian or Alaska native students ($p = .375$), black students ($p = .375$), TAG ($p = .837$), or LEP ($p = .341$).

The results of the Chi square tests showed that there was a statistically significant difference between the treatment and comparison groups in terms of Asian or Pacific Islander students ($p = .020$). In this case, the treatment group had a higher proportion of Asian or Pacific Islander students than the comparison group (12.0% versus 5.3%). There was also a statistically significant difference between the treatment and comparison groups in terms of white students ($p = .006$), the comparison group had a higher proportion of white students than the treatment group (92.6% versus 83.3%). In terms of end-of-course reading grades from the sixth grade year, the results showed that there was a statistically significant difference between the treatment and comparison groups ($p = <.001$). On a four-point grading scale (i.e., 4 = A, 3 = B, 2 = C, 1 = D, 0 = F), the

treatment group had a higher proportion of 4s (62.7% versus 50.0%) and the comparison group had a higher proportion of 2s (10.1% versus 0.0%).

Setting

Two middle schools were selected from a single school district in the Northwestern US to examine the possible impact of a 90-minute FIBS versus a traditional 45-minute departmentalized schedule on reading achievement. The school district was located in a suburban residential area near Portland, Oregon with a population of approximately 37,500. The neighborhood was comprised primarily of business and professional people, and the median household income was reported at \$120,042 per year (Best Places to Live, 2011). The community had a history of strong support of academic achievement through cooperative alliances with the school district. The two selected middle schools each had a student population of approximately 525 students, enrolled in grades seven and eight. An average of 93% of the school district's high school seniors entered college in the year immediately after graduation from high school.

Teachers

Language arts instruction for the treatment group was delivered by ten different teachers during the seventh and eighth grade years. Language arts instruction for the comparison group was delivered by five different teachers during the seventh and eighth grade years. The comparison group had half the amount of teachers because the comparison teachers taught only language arts. The treatment teachers also taught social studies to the same groups of students, thus twice as many LA/SS teachers were needed.

The mean number of years of teaching experience for the five language arts teachers in the comparison group was 16.8 years (SD = 10.342). The mean number of

years of teaching experience for the 10 language arts teachers in the treatment group was 5.9 (SD = 4.121). Of the five comparison teachers, four had an undergraduate degree in English, versus four of the ten teachers in the treatment group. With respect to advanced degrees specific to classroom instruction, one of the five comparison teachers had earned a master's degree and 7 of the ten treatment teachers had earned a master's degree. A summary of the teachers' experience and training are displayed in Table 5.

Table 5
Teachers' Experience and Training

Group	<i>n</i>	# of Teachers with an Undergraduate Degree in English	# of Teachers with a Master's Degree in Teaching	Mean (and standard deviation) of Years of Teaching Experience
Treatment	10	4	7	5.9 (4.121)
Comparison	5	4	1	16.8 (10.342)

Intervention

The independent variable was the type of schedule used to deliver integrated language arts and social studies instruction during the seventh and eighth grade years. The students in the comparison group ($n = 188$) received their seventh and eighth grade language arts and social studies instruction from two different teachers during separate 45-minute traditional class periods that met daily, Monday through Friday. The students in the treatment group ($n = 208$) received their seventh grade language arts and social studies instruction from the same seventh grade teacher as part of a 90-minute flexible interdisciplinary block period that met daily, Monday through Friday. The teachers changed when they entered eighth grade. The primary difference between the treatment

and comparison groups was the organization of the language arts and social studies classes.

Instructional Differences between Groups

While the curriculum was the same in both models, the way the content was delivered differed due to the integration of language arts and social studies and the differently-arranged block of time allowed in a 90-minute period. Teaching in a FIBS required teachers to change their instructional plans as well as their instructional methods to accommodate a longer period of sustained teaching and learning (Powell, 2011; Manning & Bucher, 2012); while teachers in a traditional 45-minute schedule were subject-matter experts (in language arts or social studies) and may have been able to use that advanced knowledge to deliver a more in-depth curriculum.

Reading Measures

There was one instrument used in this study: the OAKS reading assessment. The OAKS was a criterion-referenced assessment based on Oregon content standards. OAKS reading scores were based on an achievement scale widely used in the Northwestern US. The scale, with numbers ranging from about 175 to 300, was similar to other scales, such as the SAT scale or other growth scales. The major advantage of the assessment scale was its connection to the Oregon Content and Performance Standards. The performance standards were set by panels of teachers and curriculum specialists who reviewed test items anchored to the achievement scale and determined the score a student would have to achieve on the assessment as evidence of having met challenging academic standards. Each point on the scale was at an equal distance from the previous point on the scale, so

changes up or down were charted and viewed as comparable from year to year (Oregon Department of Education [ODE], 2007).

Data Collection

OAKS reading scores from the sixth grade year were used as the pre-test. OAKS reading scores from the seventh grade year and the eighth-grade year were used as interim assessments. OAKS reading scores from the students' ninth-grade year were used as the posttest. Scores were obtained by contacting the school district's Director of Secondary of Education through my data request. Once approved, the request was sent to the county's Education Service District (ESD). I received the OAKS Reading data from the ESD in Excel format. That dataset established the number of students in the treatment ($n = 208$) and comparison ($n = 188$) groups by eliminating any student that was not enrolled in the school district for each of the four testing points (i.e., sixth, seventh, eighth, and ninth). The original number of participants in the treatment group ($n = 274$) was reduced by 24% ($n = 66$) and the original number of participants in the treatment group ($n = 246$) was reduced by 23.5% ($n = 58$) during this selection procedure.

OAKS Administration Procedures. The OAKS reading assessment was a computer based multiple-choice assessment consisting of 62 questions. The assessment was adaptive, meaning that it selected the next question for the student based on whether or not the last question was answered correctly, choosing a relatively more challenging question if the student answered the last question correctly or a relatively easier question if the student answered the last question incorrectly.

All teachers were trained in giving the assessment and all students took the assessment in school computer labs at various times throughout the year, with their

classroom teachers serving as test proctors, as was standard procedure in the state where the study took place. Teachers had instructions to read verbatim to the students, prior to taking the assessment.

Fidelity of Implementation of OAKS. The OAKS standardized assessment was tested extensively for reliability and validity (ODE, 2007). The ODE conducted numerous studies validating the content validity, construct validity, and reliability of the measures.

Content Validity. The ODE reported that they conducted rigorous content assessments to determine what students should know. These assessments included the skills students should have and exercises they should be able to do (ODE, 2007). The findings from these assessments were developed and revised with comprehensive review by Oregon educators, parents, and other citizens. This first step provided the baseline content validity for the OAKS reading tests. Next, test specifications that provided a clear link between the test content and the content standards and their corresponding performance levels were created and validated in the same procedure. Finally, to develop the tests themselves, a consensus-driven test item development process, which included panels of educators from around the state to make judgments about the content relevance and representativeness of potential items and tasks that ensured test item faithfulness, was used to construct the final questions.

Construct Validity. As opposed to content validity, construct validity was tested by relating the student scores on Oregon's tests with scores on other tests intended to measure the same construct. Construct validity testing for the OAKS included assessments on four key metrics. First, Oregon's test scores were found to be highly

correlated with test scores from a nationally validated test, the California Achievement Test. Second, Oregon's test scores were found to be highly correlated with scores from the Iowa Test of Basic Skills. Third, Oregon's tests scores were found to be highly correlated with scores from the Northwest Evaluation Association subject tests, and finally, Oregon's OAKS reading tests were found to be highly correlated with the Lexile Scale (ODE, 2007). To the extent the scores on the tests measured similar constructs, scores for the students should have, and were found to, agree. ODE studies showed that results generalized beyond the state's assessments, and that the OAKS test had strong construct validity.

Reliability. The reliability of the OAKS test was examined through analysis of the standard error of measurement. The ODE (2007) used operational data from 2003-2004 and found that the system of assessments provided similarly reliable test scores across the range of ability, except for the extreme ends of the distribution. Standard errors of measurement were found to be similar across online and paper and pencil versions of the OAKS, as well as by subgroup (e.g. ethnicity). This finding indicated that the proficiency of students with the same overall proficiency level was measured with the same reliability regardless of demographic subgroup (ODE, 2007). The results of another study undertaken by the ODE indicated reliability of achievement classification through high classification accuracy scores for all paper-and-pencil and online forms for OAKS math and reading tests, using 2003–2004 operational data across the range of achievement standards (Nearly Meets, Meets, Exceeds). As a result, the ODE reported high reliability scores for the OAKS reading test.

Research Question and Hypotheses

The following research question and hypotheses guided the proposed study:

Research Question 1. Is there a significant difference across time on the OAKS Reading Test for middle school schedule type (TG versus CG)?

H_{1N}: There is no statistically significant relationship between schedule type and student performance outcomes in OAKS reading.

H_{1A}: There is a statistically significant relationship between schedule type and student performance outcomes in OAKS reading.

Research Question 2. Is there a significant difference across time in the OAKS Reading Achievement Standards of Nearly Meeting, Meeting, or Exceeding for middle school schedule type (TG versus CG)?

H_{1N}: There is no statistically significant relationship among OAKS Reading Achievement Standards.

H_{1A}: There is a statistically significant relationship among OAKS Reading Achievement Standards.

Data Analysis

Descriptive Statistics. The analysis of variables was conducted in two phases as recommended for the ANOVA analytic technique (Babbie, 2012; Williams, 2007). First, the descriptive statistics were analyzed. Descriptive statistics were summarized in terms of the frequency distribution and measures of central tendency. In the frequency distributions, the number and percentage of occurrence of the study variables were summarized. The measures of central tendency included the mean, standard deviation, and minimum and maximum values for the study variable. Descriptive statistics differ

from inferential statistics in that descriptive statistics describe what the data set displays; whereas, with inferential statistics, one draws conclusions about the population from the sample statistics.

Analysis of Variance. The statistical analysis performed to answer both research questions and hypotheses was a repeated measures analysis of variance (ANOVA) test. This statistical test assessed the differences in OAKS reading scores across the pre-test, intermediary periods and post-test for both questions. If statistically significant differences between treatment and comparison group OAKS reading scores at the 0.05 level of significance were found, then the null hypothesis would be rejected in favor of the alternate hypothesis.

CHAPTER IV

RESULTS

The potential impact of a flexible interdisciplinary block schedule (FIBS) on reading achievement was measured by using the Oregon Assessment of Knowledge and Skills (OAKS) reading assessment as the sixth grade pre-test, seventh grade intermediary test, eighth grade intermediary test, and ninth grade post-test. Results are organized by research questions. For each question, data tables followed by a graphical display of the score distributions are provided. Question 1 addressed the possible increase in mean OAKS [raw] reading scores over time. Question 2 addressed the possible increase in mean OAKS cut scores over time, as measured by the OAKS Achievement Standards: (a) Nearly Meets, (b) Meets, and (c) Exceeds. Students were assigned to the two groups (treatment or comparison) according to which neighborhood school they attended within the same district. Students in the treatment group received reading instruction in a FIBS, where language arts was integrated with social studies during a 90-minute block period. Students in the comparison group received reading instruction during a traditional 45-minute language arts period, with no social studies integration.

Question 1: Mean Differences in OAKS Scores Between Groups Over Time

A repeated measures analysis of variance (ANOVA) was conducted to determine whether there were statistically significant differences in OAKS assessment results between the TG and the CG over the course of the intervention. There were no outliers and the data were normally distributed for each group. The repeated-measures ANOVA showed no interaction between group (TG versus CG) and time (OAKS reading assessment for sixth grade, seventh grade, eighth grade, or ninth grade) ($p = .295$). The

repeated-measures ANOVA also revealed no main effect for group (TG versus CG) ($p = .935$). However, the repeated-measures ANOVA indicated a main effect for time (OAKS reading assessment for sixth grade, seventh grade, eighth grade, and ninth grade) ($p < .0001$). It was not surprising that the students on averaged earned higher reading scores over the course of the intervention. Table 6 reports complete descriptive statistics, including means, standard deviations, and confidence intervals for Question 1. Table 7 reports the complete ANOVA statistics for Question 1.

Table 6
OAKS Descriptive Statistics

<i>Group</i>		<i>M</i>	<i>SD</i>	<i>95% Confidence Interval</i>	
				<i>Upper Bound</i>	<i>Lower Bound</i>
6 th Grade	Comparison	236.20	.632	234.96	237.45
	($n = 188$) Treatment ($n = 208$)	235.60	.601	234.42	236.78
7 th Grade	Comparison	240.84	.668	239.52	242.15
	Treatment	240.80	.635	239.55	242.05
8 th Grade	Comparison	238.96	.598	237.79	240.14
	Treatment	239.27	.569	238.15	240.39
9 th Grade	Comparison	243.60	.556	242.51	244.69
	Treatment	243.70	.529	242.66	244.74

Table 7

OAKS Scores by Group Two-Way Repeated Measures Summary

Source	SS	df	MS	F	p
Between					
Intercept	290908224.890	1	90908224.89	421978.243	.000
Group	1.434	1	1.434	.007	.935
Error	84880.776	394	215.433		
Within					
Time	9158.154	1	9158.154	338.977	.000
Time by Group	29.663	1	29.663	1.098	.295
Error	10644.704	394	27.017		

Visual Display for Question 1. Figure 2 visually depicts the change in OAKS scores over time. Although the CG had slightly higher pre-test mean scores, differences were almost identical at the post-test between the CG and TG. Also, Figure 2 shows the lack of significant difference in mean scores between groups (TG versus CG) at any of the four testing points.

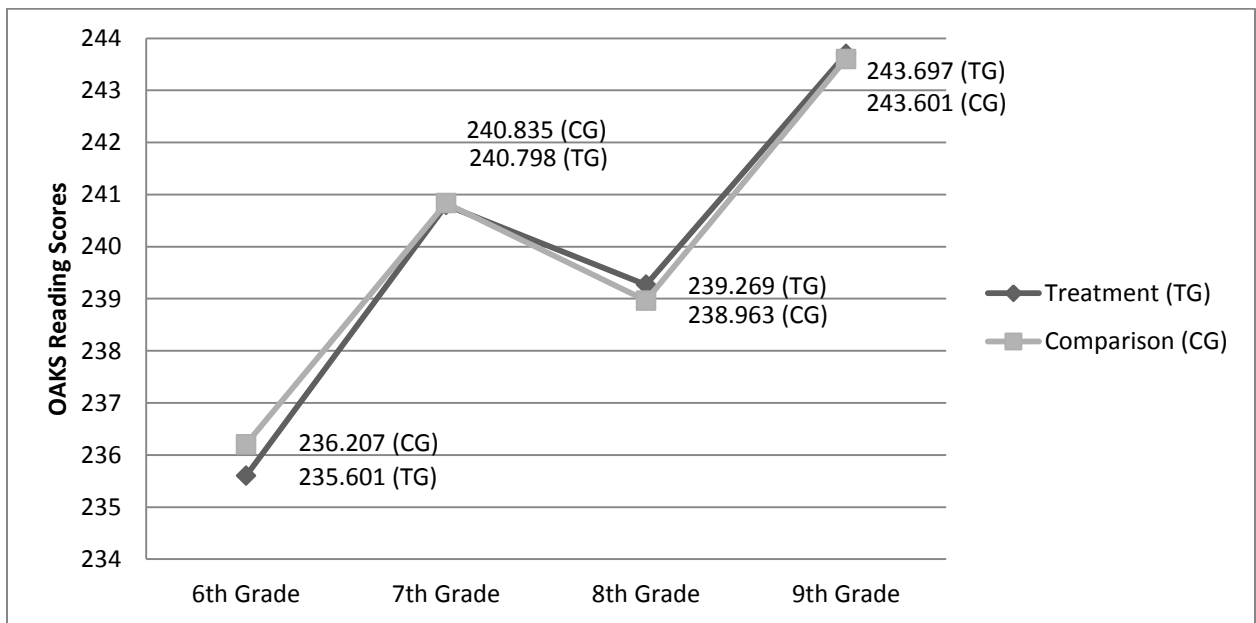


Figure 2. Change in OAKS Group Score Means over Time

Question 1 Summary

After two years of classroom instruction, students in the TG did not score significantly higher on the OAKS Reading Assessment Test than the students in the CG. Question 1 results indicated (a) no statistically significant interaction between group and time ($p = .295$), (b) no main effect for group (TG versus CG) ($p = .935$), but a statistically significant main effect for time was statistically significant (OAKS reading assessment for sixth grade, seventh grade, eighth grade, and ninth grade) ($p < .0001$). The post-test mean (with standard deviation in parentheses) for the TG was 243.70 (.529) and the post-test mean (with standard deviation in parentheses) for the CG was 243.60 (.556).

Question 2: Mean Differences in OAKS Achievement Standards Cut Scores Between Groups Over Time

A repeated measures analysis of variance (ANOVA) was conducted to determine whether there were statistically significant differences in OAKS Achievement Standards (i.e., Nearly Meets, Meets, or Exceeds) between the TG and the CG over the course of the intervention. The Oregon Department of Education (ODE), through stakeholder input, sets the OAKS Achievement Standards (ODE, 2007) and defined the score requirements for a student to nearly meet, meet, or exceed on the OAKS by content area and grade. An achievement standard is an objective definition of a certain level of performance in a content area at a particular grade, and is represented in terms of a cut score or a range of scores on the OAKS psychometric scale (ODE, 2007). Cut scores for the OAKS Achievement Standards were set by a panel of educators, parents, and community/business representatives using impact data and predictable growth information (ODE, 2007). Table 8 shows current cut scores for the OAKS reading

achievement test, by grade level, during my study. The total percentage of students from both groups that met the respective cut scores are in parentheses.

Table 8

OAKS Reading Achievement Standards Cut Scores from 2006 - 2010

	Year	Nearly Meets	Meets	Exceeds
6 th Grade	2006 - 2007	214 (4.3%)	222 (37.9%)	234 (57.8%)
7 th Grade	2007 - 2008	219 (4.1%)	227 (38.1%)	239 (57.8%)
8 th Grade	2008 - 2009	224 (9.9%)	231 (46.7%)	241 (43.4%)
9 th Grade	2009 - 2010	231 (9.3%)	236 (56.6%)	248 (34.1%)

Student scores from each of the four testing points were categorized into one of the three groups: (a) Nearly Meets, (b) Meets, and (c) Exceeds. These categorizations were then given a number value (i.e., Nearly Meets = 1, Meets = 2, and Exceeds = 3), which was used in the analysis. There were no outliers and the data were normally distributed for each group. The repeated-measures ANOVA showed no statistically significant interaction between group (TG versus CG) and time (OAKS Reading Achievement Standards cut scores for sixth grade, seventh grade, eighth grade, or ninth grade) ($p = .567$). The repeated-measures ANOVA also revealed no statistically significant main effect for group (TG versus CG) ($p = .88$). However, the repeated-measures ANOVA indicated a statistically significant main effect for time (OAKS Reading Achievement Standards cut scores for sixth grade, seventh grade, eighth grade, and ninth grade) ($p < .0001$). Overall, the mean of students meeting or exceeding achievement standards decreased over time. Table 9 reports complete descriptive

statistics, including means, standard deviations, and confidence intervals for Question 2.

Table 10 reports the complete ANOVA statistics for Question 2.

Table 9

OAKS Reading Cut Scores Descriptive Statistics

	<i>Group</i>	<i>M</i>	<i>SD</i>	<i>95% Confidence Interval</i>	
				<i>Upper Bound</i>	<i>Lower Bound</i>
6 th Grade	Comparison (<i>n</i> = 188)	2.56	.58	2.64	2.47
	Treatment (<i>n</i> = 208)	2.50	.61	2.59	2.42
7 th Grade	Comparison	2.52	.59	2.60	2.43
	Treatment	2.54	.59	2.62	2.46
8 th Grade	Comparison	2.26	.71	2.36	2.15
	Treatment	2.26	.76	2.37	2.16
9 th Grade	Comparison	2.15	.71	2.26	2.05
	Treatment	2.14	.72	2.24	2.05

Table 10

OAKS Reading Cut Scores by Group Two-Way Repeated Measures Summary

<i>Source</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between					
Intercept	8851.990	1	8851.990	7671.683	.000
Group	.025	1	.025	.022	.882
Error	454.618	394	1.154		
Within					
Time	39.252	1	39.252	160.932	.000
Time by Group	.080	1	.080	.328	.567
Error	96.097	394	.244		

Visual Display for Question 2. Figure 3 visually depicts the change in OAKS Reading Achievement Standards cut scores over time. While the CG had slightly higher

pre-test mean scores, differences were almost identical at the post-test between the CG and TG. Also, Figure 3 shows the lack of statistically significant differences in mean scores between groups (TG versus CG) at any of the four testing points.

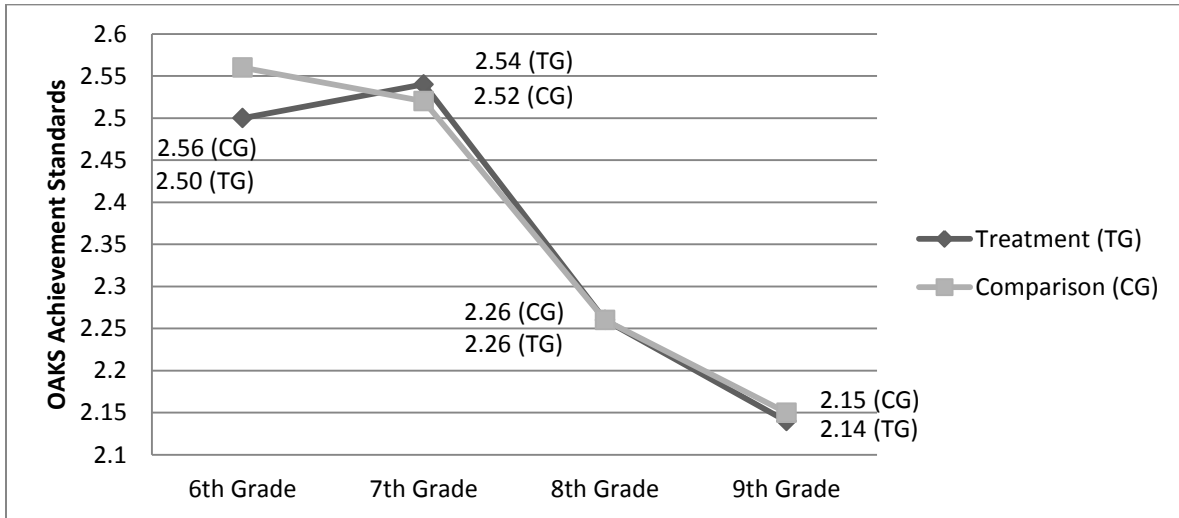


Figure 3. Changes in OAKS Achievement Standards Means over Time

Question 2 Summary

After two years of classroom instruction, students in the TG did not significantly meet or exceed achievement standards more often on the OAKS than the students in the CG. Question 2 results indicated (a) no statistically significant interaction between group and time ($p = .596$), (b) no statistically significant main effect for group (TG versus CG) ($p = .882$), but there was a statistically significant main effect for time (OAKS Achievement Standards cut scores for sixth grade, seventh grade, eighth grade, and ninth grade) ($p < .0001$). The post-test mean (with standard deviation in parentheses) for the TG was 2.14 (.72) and the post-test mean (with standard deviation in parentheses) for the CG was 2.15 (.71).

Overall Results Summary

Question 1 addressed the possible increase in mean OAKS reading scores over time. Question 2 addressed the possible differences in the mean OAKS Reading Achievement Standards cut scores over time. The results of the two-year treatment condition of a FIBS for language arts instruction did not result in statistically significant results, as measured by the OAKS. Because no statistically significant differences between TG and CG OAKS reading scores at the 0.05 level of significance were found, the null hypotheses for both Question 1 and Question 2 were not rejected in favor of the alternate hypotheses. There was no statistically significant relationship between schedule type and student performance on the OAKS.

CHAPTER V

DISCUSSION

In this chapter, I discuss the findings of my study as determined by statistical analyses and examine implications of the findings. First, I give a brief review of the purpose of the study and describe the participating schools. Second, I discuss issues of implementation fidelity that may have had an impact on the outcomes. Third, I discuss the state assessment that was chosen as the outcome measure. Fourth, I offer plausible explanations for the findings. I do this by discussing the research design, implementation of the independent variable in treatment and comparison settings, and the quality of the measurement tool used as the dependent variable. Fifth, I discuss the limitations of my study, and offer recommendations for future research.

Summary of Study

Experts suggest that block scheduling may enhance the possibility of uninterrupted class time and thus may improve student achievement (Canady & Rettig, 1995, 1996; Queen, 1998; Shortt & Thayer, 1999). As the national emphasis on the importance of academic achievement grows, teachers, administrators, and parents need empirical evidence on what impact interventions, such as block scheduling, have on student performance outcomes. The purpose of my study was to compare a flexible interdisciplinary (i.e., language arts and social studies) 90-minute block schedule (FIBS) to a traditional 45-minute schedule, where language arts and social studies were taught separately. The outcome measure to determine impact was reading achievement.

Selection of Schools

To investigate this issue, I selected two middle schools from the same school district in the Northwestern United States. These particular schools were chosen because of their near identical demographics, my access to extent data relevant to the primary research question, and most importantly, because they implemented the contrasting approaches I was interested in investigating. The treatment school ($n = 208$ students) was already implementing a FIBS during seventh and eighth grades, where language arts and social studies were blocked together and taught by one dual-licensed teacher. The comparison school ($n = 188$ students) was already implementing a traditional schedule during seventh and eighth grades, where language arts and social studies were taught separately by two different teachers. Students at both schools took the Oregon Assessment of Knowledge and Skills (OAKS) reading test during all four years of the study (i.e., sixth, seventh, eighth, and ninth grades). In grade six, the OAKS was used at the pretest and the ninth grade test was used as a posttest. The OAKS administered in grades seven and eight served as interim assessments.

Treatment School. Teachers in the treatment school ($n = 10$) all received dual licensures in language arts/social studies (LA/SS) and met together weekly as LA/SS teachers to plan integrated lessons using language arts and social studies curriculums. The school district provided a weekly 90-minute LA/SS planning period during a weekly early-release schedule for students. During this time, LA/SS teachers met to discuss, compare, and plan 90-minute LA/SS lessons.

Comparison School. Teachers in the comparison school ($n = 5$) received single licensures in either language arts or social studies and worked as a department (i.e.,

language arts or social studies) to plan lessons targeting their disciplinary content but integration across content areas was not intended in any explicit manner. The school district also provided comparison teachers with a 90-minute departmental planning period once per week during an early-release schedule for students. During this time, language arts and social studies teachers met as separate departments to discuss, compare, and plan 45-minute language arts or social studies lessons.

Differences in School Schedules. Differences in these two schools related to block versus traditional class scheduling can be dated to the 1980s when one principal attended a middle-level conference that emphasized the potential associated with interdisciplinary block scheduling. The principal of the [treatment] school came back with an energy and enthusiasm to implement this strategy. The same enthusiasm was not shared by the principal of the [comparison] school because he did not attend the same conference. School district leadership allowed the two principals to choose their own scheduling structure. As a result, appropriately-licensed staff members were hired and the trend continues to the present day.

Outcome Measure

The OAKS standardized assessment was used as the pre-test, two interim assessments, and post-test to measure the impact of the treatment on reading achievement. The reliability and validity of the OAKS reading assessment was tested by the Oregon Department of Education (ODE). Numerous studies were conducted targeting the content validity, construct validity, and reliability of the measure (ODE, 2007). The OAKS reading assessments were computer-based and administered by classroom teachers at the treatment and comparison schools during the language arts periods. This

particular assessment was chosen because it was the primary extant data available from the district in which test administration occurred prior to and after the intervention, and scores from this test were readily available analysis. This was deemed an appropriate measure for this study because state standardized test scores can provide a solid measure of student achievement and growth, and it was predicted the treatment would have a positive impact on reading performance.

Assessment Timeline

The pretest was given in April of the sixth grade year, five months prior to the initiation of the intervention, which began in the fall, 2007. The first interim assessment was given in November of the seventh grade year, two months into the intervention. The second interim assessment was given in November of the eighth grade year, one year and two months into the intervention. The post-test was administered in either October or February of the ninth grade year, four months and eight months after the intervention, respectively.

Measuring Intervention Impact Using a Reading Achievement Measure

Reading was selected as the outcome measure for four reasons: (a) I was a language arts teacher and based on my experience I expected the treatment to have an impact on reading achievement; (b) the treatment school blocked together language arts (reading) and social studies on a daily basis; (c) no other curriculum areas (e.g., math or science) were integrated this way on a daily basis at the treatment school; and (d) the language arts curriculum (e.g., reading selections and themes of study) was developed at the district level and was used in the two schools, creating some natural controls for study outcomes in terms of content coverage.

Analysis

Because I used a quasi-experimental research design (there was no random assignment of students, or classrooms, or schools) that examined extant reading data over four grades, a repeated measures analysis of variance (ANOVA) was an appropriate statistical test to compare the two approaches. A repeated measures ANOVA is appropriate to investigate changes in mean scores when three or more time points are used to collect the same type of data. For Question 1, I used sixth grade scale scores as the pre-test, seventh and eighth grade scale scores as interim assessments, and ninth grade scale scores as the post-test. For Question 2, I converted scale scores into the three categories: Nearly Meets, Meets, and Exceeds. These categories were based on cut scores established by the ODE. Students in the Nearly Meets category received a score of 1, students in the Meets category received a score of 2, and students in the Exceeds category received a score of 3. Using these numerical values, mean scores were calculated to show if there was an overall difference between treatment and comparison students in terms of state-determined achievement standards.

Results

The results of the ANOVA for Question 1 showed no statistically significant difference in the scale scores between students in the two contrasting schools. The results of the ANOVA for Question 2 showed no statistically significant difference between the two schools in meeting the achievement standards (Nearly Meets, Meets, or Exceeds) as designated by the state. Consequently, the null hypotheses for both questions could not be rejected. This means that the two groups did not differ significantly in terms of their overall performance based on OAKS scale scores or on performance categories

determined by the state to summarize overall reading proficiency. There was, however, a statistically significant difference in the main effect for reading over time, meaning that student reading levels increased over the course of the study. It is not surprising that students in both schools demonstrated growth in reading over the course of the study, because it was expected that reading development skills would increase as students progress through the grade levels.

Plausible Explanations for the Findings

Intervention Implementation in Treatment and Comparison Classrooms. A possible reason for the non-significant difference between schools could have been inconsistencies in the implementation of the treatment. For example, there may have been variation in how the treatment was delivered in LA/SS classrooms. For example, whereas one teacher in the treatment school may have continuously flexed time to better meet the individual needs of his or her students, another teacher may have flexed time less often, treating the LA/SS block more like two individual classes. A fidelity measurement system would have helped address this possibility more conclusively. Anecdotally, however, it did appear that teachers in the treatment school did meet regularly as LA/SS teachers to plan integrated lessons, while teachers in the comparison did not. During these meetings the LA/SS teachers met together, by grade level, to plan integrated units of study. As a result, it does seem reasonable to conclude that if the lesson plans were implemented as specified, the LA/SS teachers in the treatment school would have delivered integrated instruction consistent with the tenets of the interdisciplinary approach.

Measurement Tool. Although the OAKS reading assessment was determined to be a good outcome measure for this study, perhaps this assessment was not able to detect important non-reading differences between the two schools that may have occurred because of the use of interdisciplinary instruction versus traditional instruction. For example, a measure of social validity that assessed teacher and student attitudes toward teaching and learning under the treatment condition versus the comparison condition might have uncovered differences in this area. This type of assessment measured through questionnaires or interviews could have explored differences in regard to: a) student commitment to learning, b) student engagement in the curriculum, or c) teachers' use of varied instructional strategies that might be linked to student learning. Measuring student and teacher attitudes toward the 90-minute block schedule versus the 45-minute, traditional schedule would have been consistent with some existing research on this topic (Brown, 2001; Evans, Tokarczyk, Rice, & McCray, 2002; Shortt & Thayer, 1999; Staunton & Adams, 1997; Veal & Flinders, 2001), and which has uncovered possible attitudinal benefits of the interdisciplinary approach.

It is possible, too, that a different measure of reading achievement may have detected differences that were not detected using the OAKS reading assessment. The OAKS is a test where students choose the correct answer (i.e., multiple choice). Other reading assessments sometimes have students create their own responses (i.e., constructed response tests). A constructed response test might have been more in line with the intervention. This would have been a more disruptive approach, however, because no such reading assessment is currently used by the school district.

True Lack of a Treatment Effect. It may also be, of course, that actual differences in what occurred in treatment versus comparison classrooms may not have been substantial, particularly in terms of producing overall differences in academic achievement. For example, it may have been that the integration hypothesized to occur in the treatment classrooms may also have occurred in the comparison classrooms. During the two treatment years, language arts teachers in the comparison school may have worked independently and/or informally with social studies teachers to integrate social studies content into their 45-minute periods. Or comparison teachers may have used a variety of other approaches to incorporate social studies content and events into their instructional routines.

The comparison teachers may have also flexed time to deliver curriculum between or among departments by combining 45-minute periods, as needed. Teaching tends to be a collaborative process and teachers, regardless of condition, may have worked together at both schools to deliver variations of integrated curriculum. As a result, imposing a structure of a daily FIBS may not result in expected achievement gains if teachers in different disciplines are encouraged by the principal and district leaders to plan and create integrated curriculum, regardless of the schedule structure.

Socio-economic Status. The demographics described in this study did not include one group for which a treatment effect may have been detected: lower socio-economic status (SES) students. I was unable to secure SES data on these students from my district because there were so few students on free and reduced lunch that there was too high of a risk of these students being identifiable. It may be that the treatment approach works particularly well with low-income students. Perhaps conducting this type of study in a

district with a greater population of lower SES students may have resulted in different outcomes. Based on my own experience, students in lower SES communities on average rely more on the school system for a range of services and instructional supports than students from middle class homes. Research suggests that SES may play a role in the academic achievement of students in a FIBS (Deuel, 1999; Stevens, 2003). Although my study did not directly address the effects of a FIBS on lower-SES students, research does exist to suggest that the income levels of students may play a role in their academic achievement.

In the context of the current study, the theory behind FIBS is that it encourages stronger teacher-student relationships (Canady & Rettig, 1996; Evans, Tokarczyk, Rice, & McCray, 2002; Shortt & Thayer, 1999; Staunton & Adams, 1997; Veal & Flinders, 2001). Thus, perhaps the treatment may have been more effective in a setting in which the students were more responsive to instructional goals that emphasized the importance of teacher–student relationships. In the current study, it may be that school supports and encouragement already existed in large part in the homes of participating students.

High Expectations. The students in this study had the advantage of living in a high SES community with unusually high and consistent expectations for learning and achieving in a public school system (i.e., 93% of high school graduates in this district go onto college annually). Although strong relationships between teachers and students may or may not have been formed through the implementation of a FIBS in the treatment school, it did not make a difference in student performance outcomes on the OAKS reading assessment when compared to students in the comparison school.

Limitations of the Study

Study Design. Although a quasi-experimental design using extant data was an appropriate design to address the research questions, there are important limitations to quasi-experiments generally that should always be considered. In the context of the current study, the limitation is essentially that treatment and comparison groups were not constructed through random assignment so unknown differences in how the groups were constructed may have been responsible for the outcomes.

Measure of Implementation Fidelity. In intervention research, it is important to know that implementation in treatment and comparison conditions occurs according to desired specifications. In some cases, if implementation varies extensively in the treatment condition, fidelity can serve as a moderator of the relationship between condition and impact. In my study, I did not have a measure of fidelity either to (a) ensure the treatment was consistently applied in every classroom in the treatment school, was not also applied in the comparison school classrooms, or (b) assess whether fidelity of implementation was associated with outcomes.

Social Validity Measure. In the current study, the only outcome measure was an academic one (i.e., OAKS reading assessment). Other ways of assessing impact, such as measuring the perceptions of the teachers and students involved were not included. If a mixed methods approach had been employed, the use of interview data or questionnaire data to address social factors associated with the intervention may have had additional information about intervention impact. Some of these different assessment areas include: a) student interest in language arts and social studies, b) student attitudes toward learning, c) student feelings of connectivity to the teacher, or d) teacher attitudes about the

opportunity to flex instructional time. These additional areas are among those targeted in previous studies, typically where the only focus has been on social validity measures to test the effectiveness of block scheduling (Brown, 2001, Deuel, 1999; Evans, Tokarczyk, Rice, & McCray, 2002; Shortt & Thayer, 1999; Staunton & Adams, 1997; Veal & Flinders, 2001).

Teacher Sample. The sample of teachers used in this study was small. A larger sample of teachers would have helped rule out possible teacher effects in the outcomes. The total number of teachers used in this study ($n = 15$), however, was the number of teachers available at the two schools at the time of the study. In addition to the small sample, treatment school teachers ($n = 10$) and comparison school teachers ($n = 5$) were not randomly assigned to condition. As a result, differences between these two groups of teachers in terms of their approaches to teaching and indicators of instructional quality that may have influenced student achievement results.

Experience. The mean of years of teaching for the treatment school teachers was 5.9 ($SD = 4.121$) with teachers mostly in their first five years of teaching. The mean of years of teaching for the comparison school teachers was 16.8 ($SD = 10.342$). The comparison school had one teacher with 29 years of experience and this teacher taught students in seventh and eighth grades. This difference in years of experience may have been a factor in quality of teaching, because the more experienced teachers were in the comparison school. While the treatment school teachers may have been experimenting with teaching methods (as new teachers), the more experienced comparison school teachers may have been using teaching techniques that had been tested by time and perceived to be effective by the teachers who used them. However, this is quite

speculative, particularly given that there is not a demonstrated relationship between teaching experience, quality of instruction, and student outcomes.

Training. Of the treatment school teachers (n = 10), 40% (n = 4) had an undergraduate degree in English and of the comparison school teachers (n = 5), 80% (n = 4) had an undergraduate degree in English. Being a content area expert in language arts may have played a factor in the depth of reading instruction in the language arts classrooms. The majority of treatment school teachers had undergraduate majors in social studies and may have had a stronger knowledge base in social studies (e.g., historical dates and events) than in language arts (e.g., grammar and literature).

Post-test Administration. The most desirable post-test structure would have been to administer the post-test immediately at the end of the treatment (i.e., June of the eighth grade year). But instead, OAKS scores from students' ninth grade year were used as the post-test because this was when students were tested in the participating school district in accordance with state guidelines. The post-test included the October or February OAKS scores, depending on what semester the students had the required communication course in which the test was administered. The OAKS was administered during this specific course because this course was structured by the school district to allow time for state assessments. Some students were randomly enrolled during the first semester and the rest of the students were randomly enrolled during the second semester. Administering the OAKS at the end of the eighth grade year was not an option due to the restrictions based on the testing window controlled by the ODE and the school district-determined testing dates.

Future Research

Although specific types of research addressing the impact of block scheduling on student achievement outcomes at the high school level were readily available (Canady & Retting, 1995; Deuel, 1999; Eineder & Bishop, 1999), few studies to date have addressed the impact of block scheduling on student achievement outcomes in middle-level schools (Ali & Heck, 2012; Drake, 2000; Lounsbury, 2009; Vars, 2001). Because the middle-level years are often marked by a significant downturn in student achievement, especially when students transition from elementary school to sixth grade (Anderman, Maehr, & Midgley, 1999; Carnegie Council on Adolescent Development, 2000), additional investigations of the impact of middle-level block scheduling on academic achievement are needed.

Socio-economic Status. Based on the results of my study, I would suggest additional research that focused primarily on the role SES may play in the effectiveness of middle-level strategies, such as FIBS. While existing research focused primarily on how teachers changed their instructional practices as a result of FIBS and how a change from a traditional schedule to a FIBS may impact student achievement as measured by end-of-course grades and standardized assessments, research on the impact of SES on student outcomes in specific relation to middle-level scheduling patterns was not found.

Mixed Methods Research. During my review of research, I only located two studies that used a mixed methods approach to measure the impact of block scheduling on student performance outcomes (Deuel, 1999; Evans, Tokarczyk, Rice, & McCray, 2002). In both cases, the researchers used end-of-course grades as an academic measurement tool and questionnaires to collect data on teacher perceptions. However,

neither of these studies were conducted in middle schools nor did they question students on their perceptions. Future research in middle schools should incorporate both student performance and affective measures.

Fidelity of Measurement. Future research of the impact of block scheduling on student performance outcomes in middle schools should incorporate a clear fidelity measurement tool. The independent variable should be continuously assessed during the course of the treatment to ensure proper implementation. This could be done by collecting formative teacher and/or survey data at specific times during the treatment.

Conclusion

Prior to this study, I expected that applying principles of middle-level educational theory (e.g., interdisciplinary block scheduling) would make a difference in classroom instruction and student performance outcomes. As a middle-level teacher and counselor, my perception was there was increased student performance outcomes as a result of middle-level reform efforts (e.g., FIBS) described in documents such as *Turning Points* (1989, 2000) and *This We Believe* (2010). The results of my study, however, suggest that there may not be a significant achievement difference between schools that implement an interdisciplinary scheduled compared to schools that implement a traditional, departmental approach.

As a former teacher and counselor in a lower SES community, my personal experience was that reform efforts create a sense of community in classrooms and strong relationships between teachers and students. As a result, I felt that students wanted to work harder and that by doing so they achieved greater academic results. Until I began this study, I believed these efforts would be effective in any middle school, regardless of

student demographics. After completion of my study, however, my conclusion is that perhaps students of lower SES had the most to gain, on average, from school personnel who provided a great deal of encouragement and support, because in many cases these students might not receive this type of support as often from individuals outside of school settings. As a result, these school relationships and encouragement from teachers in schools may have made a stronger difference in the academic achievement of students from lower SES backgrounds compared to students from middle class backgrounds.

Although FIBS cannot be a resolution for all issues surrounding student achievement in middle schools, its potential as a contributor to student learning has been demonstrated (although this is not the case in the current study) and should continue to be explored empirically. Future researchers should work to more clearly delineate the characteristics of block scheduling that may have a more direct impact on student achievement in middle schools. Although the results of my study revealed that FIBS did not have a significant impact on reading achievement, under different implementation contexts it may have the potential to strengthen teaching and learning during the middle grades.

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