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## **The Effect of High School Schedules on Ninth Grade Student Achievement Indicators and Overall School Performance Measures**

### **James L. Pate, PhD.**

Professor, Leadership, Technology, and Workforce Development  
Valdosta State University, Valdosta, Georgia  
E-mail: [jl pate@valdosta.edu](mailto:jl pate@valdosta.edu)

### **Christopher D. Chastain, EDD**

Principal, Books County High School, Quitman, Georgia  
E-mail: [cdchasta@valdosta.edu](mailto:cdchasta@valdosta.edu)

### **Lantry L. Brockmeier, PhD.**

Professor, Leadership, Technology, and Workforce Development  
Valdosta State University, Valdosta, Georgia  
E-mail: [llbrochmeier@valdosta.edu](mailto:llbrochmeier@valdosta.edu)

### **John D. Lairsey, EDD**

Assistant Professor, Leadership, Technology, and Workforce Development  
Valdosta State University, Valdosta, Georgia  
E-mail: [jdlairsey@valdosta.edu](mailto:jdlairsey@valdosta.edu)

### **KathyD. Nobles, EDD.**

Assistant Professor, Leadership, Technology, and Workforce Development  
Valdosta State University, Valdosta, Georgia  
E-mail: [knobles@valdosta.edu](mailto:knobles@valdosta.edu)

### **Micheal J. Bochenko, EDD.**

Assistant Professor, Leadership, Technology, and Workforce Development  
Valdosta State University, Valdosta, Georgia  
E-mail: [mjbochenko@valdosta.edu](mailto:mjbochenko@valdosta.edu)

### **Abstract**

High schools around the nation are attempting to find a solution to the so called “ninth grade bulge,” or the increasing and ever-growing systematic problem of ninth grade retention. This study utilized a mixed methods approach with a sequential explanatory research design. A sample of 328 high schools from Georgia were selected for the study. Of these 174 high schools utilized a 7-period daily schedule and 154 high schools used a 4 X 4 block daily schedule. The quantitative portion of the study examined ninth grade student achievement by examining the Georgia Milestones End-of-Course (EOC) Assessments for ninth grade Literature, Algebra I, and Biology. For overall school performance the study examined College Career Performance Index scores (CCRPI), 4-year cohort Graduation Rates, School Climate scores, and overall student retention rates. The qualitative aspect of this study examined interview responses from twelve principals (six from each schedule type) interviews regarding the schedule type used in their schools, whether they were considered effective in improving student achievement, and what they considered the factors contributing to these improvements in achievement.

Results indicated there was a significant difference in ninth grade achievement and overall school performance based on school location (rural, urban, suburban) and the percentage of student receiving free and lunch. When examining the interaction effects, two independent variables were found to be significant between the schedule type.

**Key Words:** Block Schedules; Student Achievement; Ninth Grade Bulge; School Schedules; Graduation Rates

## Introduction

Prior to 2012, Georgia high schools were compared annually according to how students performed on the Georgia High School Graduation Test (GHSGT) administered to students during the eleventh-grade year giving high schools three years to prepare their students for high-stakes testing. The results of the GHSGT determined the students' eligibility for graduation and provided a measure of school performance based on the students' overall performance. The No Child Left Behind (NCLB) waiver implemented in 2012 changed how schools and student performance were measured resulting in a shift from Annual Yearly Progress (AYP) under No Child Left Behind (NCLB) to Georgia's College and Career Readiness Performance Index (CCRPI). Georgia student achievement for high school aged students was no longer measured by the GHSGT, but now would be assessed by the Georgia Milestones End-of-Course-Tests (EOCT). Unlike the GHSGT administered only to eleventh graders, the EOCT was administered in eight courses consisting of two in each core content, spanning ninth through twelfth grade: Algebra I, Geometry, 9<sup>th</sup> Grade Literature, American Literature, U.S. History, Economics, Biology, and Physical Science. Of these EOCTs, three were administered to ninth graders: 9<sup>th</sup> Grade Literature, Algebra I, and Geometry.

Schools needed to focus more on ninth-grade achievement considering the new accountability process and the emphasis placed on ninth-grade performance. The new accountability process including EOCTs highlighted a national dilemma and is referred to as "the ninth-grade bulge," a term used to describe percentage increase in the total number of students enrolled in ninth grade over the number enrolled in eighth grade (Neild, 2009). For example, a 32 percent increase in enrollment in ninth grade from the previous year eighth grade cohort was experienced in some states. Wheelock and Miao (2005), suggested the "ninth-grade bulge" contributes to the nation's steady decline in the graduation rate.

This study examined school organization and its effects on first-time ninth graders' academic success and overall school performance. Success in Georgia for ninth grade student achievement was determined by student results on the Georgia Milestones End-of-Course assessments in 9<sup>th</sup> Grade Literature, Algebra I, and Biology. Additionally, overall school success was measured by examining each school using the College Career Readiness Performance Index (CCRPI) score, the 4-year cohort graduation rate, the school climate score, and overall retention rate.

## Literature Review

The review of literature focused on the effect of high school schedules on individual student achievement and overall school performance. There were four distinct areas: the origins of the high school schedule; theories behind school reform and scheduling; the examination of the two most widely utilized schedules in Georgia, the traditional seven-period and 4 X 4 block schedules; and the issue of ninth-grade retention.

Silva, White, and Toch (2015) reported school schedules began with the Carnegie Foundation for the Advancement of Teaching in 1906. This group provided a definition for a credit hour of learning and labeled it as a "Carnegie Unit." The Carnegie Unit is defined as 120 contact hours with an instructor, typically organized in a one hour per day, five days per week with a duration of 24 weeks. In Georgia (GaDOE, 2011), local school systems require students to earn a minimum of 23 credits or Carnegie Units: four units each in math, English/language arts (ELA), and science; three units of social studies; three units of world languages or CTAE (Career, Technical, and Agricultural Education) courses; four elective units and one unit of health and physical education. States vary in the minimum number of Carnegie Units required for students to graduate. Although the Carnegie Unit is utilized to track and monitor student learning, it was initially designed to assess faculty workloads for college and university professors (Uitinen, 2013). Due to a desire for "efficiency, mass production, and work uniformity" in the scientific management era, the Carnegie Unit became a way to ensure the education of the growing school-aged population (Hackmann, 2004).

Hackmann (2004) stated high school schedules were not a common consideration until the beginning of the 1950s with the introduction of modular scheduling. This quickly faded due to the wide variations of class times and schedules. Modular scheduling left students unsupervised, creating many disciplinary and safety issues.

Education took top legislative priority in 1957 due to the launching of Sputnik, which resulted in the National Defense Education Act (NDEA) in 1958. The NDEA encouraged educational innovation in math, science, and world languages to be competitive globally in the nuclear age of technology (USDE, 2009).

Despite these efforts there was a steady decline in the United States on standardized tests compared to competing industrialized nations (McKnight, 1987). President Ronald Reagan authorized the Secretary of Education, Terrell H. Bell, to create the National Commission of Excellence in Education (McKnight, 1987). In 1983, the NCEE released a report, *A Nation at Risk*, which compared the United States to other high-ranked industrialized nations using 19 academic assessments and compared the time each country committed to mathematics during the school day. The study found the other countries committed three times more minutes in class to mathematics than the United States, which generated concern and a call for reform in the United States for different scheduling options (NCEE, 1983). For example, the NCEE (1983) found that schools in the United States typically follow a 180-day school calendar with six hours of instruction, whereas in other countries, students are in attendance 220 days for eight hours a day.

One response to *A Nation at Risk* was a strong focus on school schedules; more specifically, a comparison between the traditional 45 to 50-minute class period to a 90-minute block schedule (Stanley, Spradlin, & Plucker, 2007). The continuing concern for education reform in the 1990s led to the creation of the Education Council Act of 1991, used by Secretary of Education Richard W. Riley to create the National Education Commission on Time and Learning (NECTL). This group released a report entitled *Prisoners of Time* (Stanley et al. 2007) that addressed academic success for schools and communities by focusing the investigation on course structures and scheduling options. The report inspired educators to rethink the academic day and find new ways to structure the time spent in class (Stanley et al., 2007).

Stanley, Spradlin, and Plucker (2007) argued these reports encouraged educators to investigate alternatives to the 45 to 50-minute class schedules and how each schedule option affects students' academic success. In fact, by 2006, at least 50% of high schools in the U.S. were on some type of modified or block schedule (Dexter, Tai, & Sadler, 2006).

According to Hackmann (2004), there are two distinct theories on scheduling reform: behaviorism and constructivism. Leaders of the behaviorist theory, B.F. Skinner, Ivan Pavlov, and John Watson, theorize that schools are more successful when information is shared in smaller segments allowing time to practice and repeat instruction if necessary. In contrast, constructivists led by Vygotsky and Piaget argued for more extensive time frames to allow individuals the opportunity to be socially engaged in their learning and gain a deeper understanding of the material (Hackmann, 2004).

There are four types of schedules most often used in the United States; the traditional seven-period schedule (can be six or eight periods), the 4 X 4 block, a modified block (alternates days rather than changing at the end of a semester), or a trimester schedule also known as the Copernican Plan (Ford, 2015). The two most predominantly used schedule options in Georgia (GaDOE, 2018) are the traditional seven-period (see Table 1) and the 4 X 4 block schedule (see Table 2).

The traditional seven-period schedule consists of seven 45 to 55-minute classes for the 180-day school year providing approximately 9,000 minutes of seat time per class resulting in 7 courses per school year for students. In contrast, the 4 X 4 block schedule consists of four courses organized in four 90-minute time increments per day for 90 days and four new courses for the remaining 90 days of school resulting in a total of 8 courses per school year for students. This provides approximately 8,100 minutes of seat time. Generally, students would attempt two academic courses and two elective courses per semester.

Since the industrial age, the traditional schedule used product-oriented thinking, structured to provide a set number of instructional minutes to teach a pre-determined curriculum (Kruse & Kruse, 1995). Kruse and Kruse continue by describing how students go from class to class for six, seven, or eight periods a day for 180 days earning one credit per course on a course-by-course basis determined by each student's proficiency in the standards assigned to each course. Cromwell (1997) contends a traditional schedule provides more seat time than a block schedule strictly by looking at the number of instructional minutes. A traditional schedule provides approximately 9000 instructional minutes per course compared to a 4 X 4 block, which is approximately 8100 instructional minutes per course.

Cromwell (1997) argues that a traditional schedule with shorter class periods is more advantageous for students with specific learning disabilities or students with attention disorders. Cromwell suggests a traditional schedule helps students fine-tune their time management skills by balancing a busy schedule. It would be more beneficial, Cromwell states, for students with attendance issues since they would not miss as much instruction as a student in a block schedule structure for any particular course.

Rettig and Canady (2003) stated that teachers who advocate for block schedules suggested it provides more time to plan and implement extended lessons with multiple instructional strategies to meet the individual needs of their students. Another claim is that the increased time allows for more in-depth learning and provides the student and teacher more confidence in the learning process (Imbimbo&Gilkes, 2009). Teachers contend more substantial and robust teacher-student relationships are formed during block scheduling due to the extended time in class and fewer students to interact with each semester (Santos &Rettig, 1999).

Canady and Rettig (1996) contend block schedules significantly reduce the number of classes taught daily but increase the real instructional time in each class. Ford (2015) pointed out the 4 X 4 block schedule is intended for teachers to transition to different activities every 12-15 minutes providing their learners with multiple opportunities to grasp the concept and allow the teacher time to differentiate the material to meet the needs of all learners. Wilson and Stokes (1999) note ample planning time and significant professional learning for teachers as vital when implementing block scheduling.

Two factors Wilson and Stokes (1999) emphasized were keeping the planning period sacred and using multiple instructional strategies during the 90-minute instructional block. In addition, Wilson and Stokes state their research shared one crucial factor; teachers need continuous professional learning to effectively organize a block schedule so instructional time is valued and to keep students on task.

Wheelock and Miao (2005) contend the "ninth-grade bulge" significantly contributes to the nation's continually decreasing graduation rate. Neild (2009) defines the bulge, or bottleneck, as the increase in the number of students in ninth grade over the number enrolled in the same cohort in eighth grade the year prior. Many states witnessed a significant increase in student numbers (32 percent increase) in ninth grade compared to eighth grade the previous year. The bulge partially exists because an increased number of students are unsuccessful in meeting requirements of earning enough Carnegie units to be promoted to tenth grade. Pharris-Ciurej et al. (2012) concluded that less than 50% of students who begin ninth grade graduate four years later. To reduce the bulge, school leaders should use data to drive school improvement (Pharris-Ciurej et al., 2012). Neild (2009) provided evidence that students who were not successful during their ninth grade year had minimal odds of earning a high school diploma since one-third of the nation's dropouts were never promoted beyond ninth grade. In 2011, the bulge had grown from a 4% increase in 1982 to a 12% increase in enrollment in 2011 (Pharris-Ciurej et al., 2012). Neild reported four theories to explain this increase in enrollment: results of decreased parental supervision but increased peer influences; students transitioning to a new school where new bonds and relationships must be formed; students being inadequately prepared for high school; and the organization of the high school causing a difficulty in the transition. In Neild's opinion, school districts should address the four theories with a policy response to prevent a poor transition from eighth to ninth grade. Akos and Galassi (2004) interviewed students regarding transitioning to the ninth grade. They discovered there were three main areas of concern: academics (new teachers, higher expectations, more homework, increasingly more rigorous assessments), procedural (school layout and class transitions), and social (making new friends and the overall social aspect of high school). Uvaas and McKeivitt (2013) contend school systems must develop a program including curriculum to prepare students for the transition and provide the five necessary components needed to be effective. A successful transition program needs to be school based for a minimum of eight weeks, promote academic development and achievement, promote school pride and connectedness, examine and minimize the number of school transitions students experience, and include a mechanism for early identification and support of students experiencing multiple stressors (Uvaas&McKeivitt, 2013).

### ***Purpose of the Study***

The primary purpose of the study was to determine if there was a significant difference in ninth grade student achievement and overall school performance measures between schools utilizing different schedules. A secondary purpose was to allow selected principals to explain the similarities or differences between the two schedule types (7-period or 4 X 4 block) on student achievement and overall school performance measures.

### ***Methodology***

The methodology section is divided into three subsections. First, the research design will be discussed followed by a discussion of the participants. Finally, the data analysis will be discussed.

## Research Design

A sequential explanatory design for mixed methods research was utilized for this study and was conducted to investigate the relationship between high school schedules, school location, and the percentage of students receiving free or reduced lunch on 9th-grade student achievement and overall school performance. In the quantitative phase, type of school schedule, school location, and the percentage of students receiving free or reduced lunch served as the independent variables, whereas the Georgia Milestone's End-of-Course assessment data for three EOCTs (9<sup>th</sup> Grade Literature, Algebra I, and Biology), CCRPI scores, school climate ratings, four-year cohort graduation rates, and overall retention rates for each school served as the dependent variables. In the qualitative phase of the study, 12 principals were purposefully selected to participate in an interview to discuss the quantitative results.

## Participants

The Georgia Department of Education (GaDOE, 2018b) reported there were 476 ninth- through twelfth-grade high schools in Georgia with 384 of the 476 being brick-and-mortar public high schools. Of the 384 brick-and-mortar public high schools, a 4 X 4 block schedule was employed by 154 public schools and a seven-period schedule was used by 174 public high schools. The remaining 56 public high schools used either a hybrid, a six-period, eight-period, or an A/B/D block schedule and were not included in the study.

Principals in the qualitative phase were purposefully selected based on the type of school schedule (7-period or 4 X 4 block) and school location (rural, suburban, or urban). Overall, 12 principals were selected with two principals from each combination of school schedule type and school location.

## Data Analysis

For the quantitative phase of the study, archival data were obtained from the Georgia Department of Education. The type of school schedule, school location, and the percentage of students that received free or reduced lunch were nominal level variables. To determine the school location (i.e., rural, suburban, or urban) of the 328 schools, the National Center for Educational Statistics (NCES) was used. NCES reported there were 156 rural, 120 suburban, and 52 urban schools. The levels of the percentage of students receiving free or reduced lunch were generated by dividing the data into four quartiles. Quartile 1 consisted of the schools where 0% to 38.78% of the student population qualified for free or reduced lunch, Quartile 2 ranged from 38.79% to 59.41%, Quartile 3 ranged from 59.42% to 90.64%, and Quartile 4 ranged from 90.65% to 100% of the student population. The Georgia Milestone's End-of-Course assessment data for 9<sup>th</sup> Grade Literature, Algebra I, and Biology as well as the CCRPI scores, school climate ratings, four-year cohort graduation rates, and overall retention rates were on the interval or ratio measurement level.

A factorial analysis of variance (factorial ANOVA) with R was employed to answer the research questions. For the first two research questions, the type of school schedule was cross referenced with the school location to investigate differences in the dependent variables. The third research question used the type of schedule crossreferenced with the level of the percentage of students receiving free and reduced lunch on the dependent variables. Post hoc test results were used as a follow-up when either a significant interaction effect or main effect was found.

Statistical considerations and assumptions were examined for each factorial ANOVA. Only one school had missing data in this dataset. The missing data were on two dependent variables and subsequently dropped from that analysis. Outliers were examined and dealt with through data transformation (Yeo-Johnson procedure). Normality and homogeneity of variance were examined in each analysis. The Yeo-Johnson data transformation alleviated the issue with outliers, nonnormality, and/or heterogeneity in over 70% of the analyses. If data transformation did not correct the issue, the aligned rank transformation for the nonparametric factorial ANOVA was used (sub-questions, 1a, 2a, and 3d).

## Results

The results section consists of two subsections. First, the quantitative results followed by the qualitative results are presented.

### Quantitative Results

Sub-question 1a used the aligned rank transformation for nonparametric factorial ANOVA due to violations of the parametric assumptions. There was a significant difference by school location on the 9<sup>th</sup>-grade Literature EOC (see Table 1). Eta squared results indicated this was a small to medium practical difference.

Both rural schools and suburban schools performed significantly higher than urban schools, whereas there was no difference in performance between suburban and rural schools. For sub-question 1b, both the main effects (i.e., type of schedule and school location) indicated there was a significant difference in the 9<sup>th</sup>-grade Algebra EOC. The difference in the type of schedule was a small to medium practical difference. Schools on the 4 X 4 block schedule performed higher than schools on the traditional seven-period schedule. Eta squared results for the difference in school location was found to be a medium practical significance. Rural (R) schools and suburban (S) schools performed significantly higher than urban (U) schools, while there was no significant difference in performance between rural and suburban schools. For sub-question 1c, there was a significant interaction effect between the type of schedule and school location on the 9<sup>th</sup>-grade Biology EOC. The difference was a small to medium practical effect. Both the R-4 X 4 block and S-4 X 4 block schools performed significantly higher than U-seven period schools. The R-seven period schools performed higher than S-seven period schools. Probably the more important finding was that the U-4 X 4 block schools performed significantly higher than U-seven period schools on the 9<sup>th</sup>-grade Biology EOC.

Table 1 Factorial ANOVA Results for Ninth Grade Georgia Milestone EOC by Type of School Schedule and School Location

		Effect	Significance Tests	Tukey Post Hoc Tests
1a	Literature EOC	Interaction effect Schedule effect School location effect	<i>ns</i> <i>ns</i> $F(2,322)= 6.51, p < .001,$ $\eta^2 = .04$	R > U*, S > U **
1b	Algebra EOC	Interaction effect Schedule effect School location effect	<i>ns</i> $F(1,269)= 10.90, p < .001,$ $\eta^2 = .04$ $F(2,269)= 10.77, p < .001,$ $\eta^2 = .07$	4X4 block > seven-period **  R > U **, S > U **
1c	Biology EOC	Interaction effect	$F(2,280)= 5.92, p < .001,$ $\eta^2 = .04$	R-seven period > S-seven period ** R-seven period > U-seven period ** S-seven period > U-seven period ** R-4x4 block > U-seven period ** S-4x4 block > U-seven period ** U-4x4 block > U-seven period *

Note. The independent variables in these factorial ANOVAs were the type of school schedule (4X4 block and seven-period) and school location (rural (R), suburban (S), and urban (U)).

\*  $p < .05$ , \*\*  $p < .001$ .

For sub-question 2a, the aligned rank transformation for nonparametric factorial ANOVA was used the second time due to violations of the parametric assumptions (see Table 2). There was a significant interaction effect between the type of schedule and school location on the schools' CCRPI scores. Eta squared results indicated this was a small practical significance. The U-4 X 4 block schools had significantly higher CCRPI scores than the U-seven period schools. The only other significant interaction was that S-4 X 4 block schools had higher CCRPI scores than U-seven period schools. No other interactions were found to be significant. For sub-question 2b, there was a significant main effect of school location on the four-year graduation rate. This difference was identified as a medium practical effect. Both rural and suburban schools had a significantly higher graduation rate than urban schools. The results for sub-question 2c were similar to sub-question 2b. School location was found to be significantly different on the school climate rating.

However, this difference was a small to medium practical effect. Both rural and suburban schools had a significantly higher school climate rating than urban schools. For sub-question 2d, there was a significant school location effect on the school retention rate.

Eta squared results indicated this difference was a large practical effect. Urban schools had a significantly higher retention rate than rural and suburban schools. Interestingly, suburban schools had a significantly higher retention rate than rural schools.

Table 2 Factorial ANOVA Results for School Scores by Type of School Schedule and School Location

		Effect	Significance Tests	Tukey Post Hoc Tests
2a	CCRPI Score	Interaction effect	$F(2,322)= 3.66, p < .03,$ $\eta^2 = .02$	U-4x4 block > U-seven period * S-4x4 block > U-seven period *
2b	Graduation Rate (4-year)	Interaction effect Schedule effect School location effect	<i>ns</i> <i>ns</i> $F(2,321)= 11.86, p < .03,$ $\eta^2 = .07$	R > U **, S > U **
2c	School Climate Rating	Interaction effect Schedule effect School location effect	<i>ns</i> <i>ns</i> $F(2,322)= 6.07, p < .001,$ $\eta^2 = .04$	R > U **, S > U *
2d	Retention Rate	Interaction effect Schedule effect School location effect	<i>ns</i> <i>ns</i> $F(2,322)= 27.90, p < .001,$ $\eta^2 = .15$	S > R **, U > R **, U > S *

Note. The independent variables in these factorial ANOVAs were the type of school schedule (4X4 block and seven-period) and school location (rural (R), suburban (S), and urban (U)).

\*  $p < .05$ , \*\*  $p < .001$ .

Sub-questions of question 3 used the same four dependent variables as employed for question 2. However, the independent variables were the type of school schedule and the levels of the percentage of students receiving free or reduced lunch. For sub-question 3a, the interaction effect and main effect of the type of schedule were not significant (see Table 3). The levels of the percentage of students receiving free or reduced lunch were statistically significant on the CCRPI scores. Eta squared results indicated that this was a large practical effect. Level 1 (smallest percentage) yielded higher CCRPI scores than levels 2, 3, and 4. Level 2 (second smallest percentage) yielded higher CCRPI scores than levels 3 and 4. Level 3 had higher CCRPI scores than level 4. For sub-question 3b, the levels of the percentage of students receiving free or reduced lunch were statistically significant on the four-year graduation rate. Eta squared results indicated this difference was a large practical effect. Level 1 was significantly higher than levels 3 and 4 and level 2 was significantly higher than levels 3 and 4 on the graduation rate. For sub-question 3c, the interaction effect was not significant but both main effects were significant. The 4 X 4 block type of schedule yielded a higher school climate rating than the seven-period schedule type. This was a small effect size as evidenced by the eta squared value. On the other hand, the levels of the percentage of students receiving free or reduced lunch were statistically significant and were of high practical importance. Level 1 (smallest percentage) yielded higher CCRPI scores than levels 2, 3, and 4. Level 2 (second smallest percentage) yielded higher CCRPI scores than levels 3 and 4. For sub-question 3d, the aligned rank transformation for nonparametric factorial ANOVA was employed due to the violation of assumptions even after data transformation. The interaction effect and the main effect of the type of school schedule were not significant. The levels of the percentage of students receiving free or reduced lunch were statistically significant and was a medium effect. Level 1 yielded higher retention rates than levels 3 and 4. Level 2 generated higher retention rates than levels 3 and 4.

Table 3 Factorial ANOVA Results for School Scores by Type of School Schedule and Levels of the Percentage of Students Receiving Free or Reduces Lunch

		Effect	Significant Tests	Tukey Post Hoc Tests **
3a	CCRPI Score	Interaction effect Schedule effect FRL effect	<i>ns</i> <i>ns</i> $F(3,319)= 119.01, p < .001,$ $\eta^2 = .52$	1 > 2, 1 > 3, 1 > 4, 2 > 3, 2 > 4, 3 > 4
3b	Graduation Rate (4-year)	Interaction effect Schedule effect FRL effect	<i>ns</i> <i>ns</i> $F(3,319)= 33.23, p < .001,$ $\eta^2 = .24$	1 > 3, 1 > 4, 2 > 3, 2 > 4
3c	School Climate Rating	Interaction effect Schedule effect  FRL effect	<i>ns</i> $F(1,319)= 4.74, p < .03,$ $\eta^2 = .01$ $F(3,319)= 21.86, p < .001,$ $\eta^2 = .17$	4x4 block > seven period 1 > 2, 1 > 3, 1 > 4, 2 > 3, 2 > 4
3d	Retention Rate	Interaction effect Schedule effect FRL effect	<i>ns</i> <i>ns</i> $F(3,319)= 9.20, p < .001,$ $\eta^2 = .08$	1 > 3, 1 > 4, 2 > 3, 2 > 4

*Note.* The independent variables in these factorial ANOVAs were the type of school schedule and levels of the percentage of students receiving free or reduced lunch (FRL). Level 1 had the lowest percentage of students receiving free and reduced lunch, whereas level 4 had the highest percentage of students receiving free or reduced lunch.

\*\*  $p < .001$ . All Tukey post hoc tests were significant at this level.

### Qualitative Findings

Question 4 served as the qualitative, explanatory phase of the study. Twelve principals were purposively selected based on the combination of schedule type (7-period and 4 X 4 Block) and location (rural, suburban, urban). Two principals from each combination of schedule type and school location were interviewed using a validated script comprised of six interview questions. Before the interview, the potential interviewee received a link to schedule a date and time for the interview as well as a consent form and the interview questions.

### Advantages and Disadvantages of Schedule Types

The first interview question asked principals about the advantages and disadvantages of the principal's current type of schedule. From the responses of 4 X 4 block principals, four advantages emerged. First, students have more opportunities to earn credits. Principal Miller, a 4 X 4 block principal, shared how the free or reduced lunch status did not affect their decision in choosing their schedule type. However, in retrospect, it should have since it provides students with more opportunities to earn credits and to participate in remedial and credit recovery programs. Second, the schedule reduces the number of courses a student must focus on when preparing for high-stakes tests. Third, there is more time for teacher planning and for grading along with reducing the number of students the teacher is responsible for during the day. Principal Roberts indicated that students on a 4 X 4 block schedule have fewer courses to take and more instructional time in class, which allows students to focus on just one high-stakes test at a time. Fourth, the schedule reduces the number of disciplinary incidents. Principal Craft adamantly stated that a 4 X 4 block schedule reduced disciplinary behaviors for the simple fact there were fewer transitions, "obviously, you know a lot of the problems that occur in school is during transition times."

Principals using a seven-period schedule responded that there were four main advantages of the seven-period schedule. First, students have more diverse classes during the school day. Second, shorter classes better fit the attention span for high school students. Principals Leaf, Sermons, Chester, and Simon agreed that a seven-period schedule is better suited for a high school student's short attention span. Third, the schedule eliminates the possibility of learning gaps by having classes for each course daily for the entire year.



Chester stated, "the seven-period schedule for our students gives the student a smaller dose of academics per day over a longer time, and the smaller doses help the student's attention span and provide a longer time for students to be immersed in the content." Fourth, Principal Simon argued that another advantage of a seven-period schedule was that teachers only had to plan for a 45 to 55-minute lesson rather than prepare for 90 minutes of instruction.

Principals of the 4 X 4 block schedule identified four potential disadvantages. First, all principals agreed about the difficulty for teachers to plan and engage students for the entirety of a 90-minute class. Principals Miller, Craft, and McCloud were all concerned with the engagement, or lack thereof, during a 90-minute lesson. Craft stated, "if the teacher is not properly engaging their students, there could be a tremendous waste of instructional time." Second, principals had a fear of learning gaps in regard to continuity since there is a potential of a student completing a course in the fall of their freshman year and not taking the following course until possibly the spring of their next year. Principal Miller used a world language as an example with a student taking Spanish I in the fall of their freshman year then taking Spanish II in the spring of their sophomore year causing a gap of a full 12 months between courses and instruction in this example. Such a large gap of time between courses could pose issues with student success. The other two perceived disadvantages shared by principals of a 4 X 4 block schedule were logistically scheduling students twice per year and possible social issues for students who have difficulty building relationships.

Principals of the seven-period schedule identified four disadvantages. First, principals Sermons, Grayson, and Simon all agreed that the 7-period schedule is a more intense schedule due to students having to prepare and study for four academics and three electives at one time. Second, principals Chester, Grayson, and Layton agreed a significant disadvantage is with teachers having more preps, more students they are responsible for, and less time for planning and grading. Chester stated, "it is hard for teachers to have a larger number of students because it means they have a larger number of papers to grade and relationships to build." Third, transfer students from a 4 X 4 block schedule may be far behind or far ahead of their classmates depending on when they transferred. Fourth, students have fewer opportunities to earn credits.

### **Influence of Schedule Type on GMA EOC Performance**

All principals utilizing the 4 X 4 block schedule indicated that this schedule offered three advantages to Georgia Milestones EOC performance. Students have fewer academics to focus on each semester, have more time for remediation, and the 4 X 4 block breaks up testing into two different testing windows. Principals Fowler and Flanders expounded on the view of Craft, McCloud, and Roberts by sharing students focusing on two academic courses per semester decreases the chances of students having more than one EOC to prepare for when testing occurs in the winter and spring, which positively impacts and increases student achievement.

Two principals employing the seven-period schedule indicated an advantage of receiving instruction throughout the year positively impacts student performance. A principal countered their argument by sharing that it may be more difficult and stressful since a student might have to prepare to take two or more EOCs in the same week, rather than one in the winter and the other in the spring. Principals Grayson and Simon both agreed their students' scores were negatively impacted by their schedule and strongly agreed that student achievement would increase if they switched to a 4 X 4 block schedule.

### **Influence of Schedule Type on School Climate**

All principals using the 4 X 4 block schedule identified that their schedule positively impacts the school climate. First, the schedule influences climate due to the decreased stress on students and teachers due to fewer classes each day. Principal McCloud continued by stating, "students were less stressed and not as overwhelmed since they only had two academics to focus on at a time." In addition, principal McCloud said, "teachers were less stressed since they had fewer students they were responsible for at a time, and more time to plan, grade papers, prepare for labs/learning activities." Principals Craft, Flanders, Roberts, and Fowler agreed that the climate was more favorable for teachers and students, positively impacting student discipline. Principals (i.e., five of six principals) of the seven-period schedule stated that school climate comes from the top-down and the principal's decisions and actions create the school climate. However, two-thirds of the seven-period principals shared how the schedule might have a negative impact on behavior in their schools. For example, principal Leaf said, "high school students look for those opportunities when they are not supervised to find trouble." Principal Sermons had similar beliefs stating, "referrals increase because there is more opportunity the more you transition."

Principals Leaf, Sermons, Chester, and Layton all agreed that with the increase in transitions comes an increase in opportunities for discipline issues. However, two principals stated that increased transitions should not negatively impact behavior if the school climate is good.

### **Influence of Schedule Type on the Graduation Rate**

The last interview question asked principals about high school graduation and how schools tried to ensure students remained on track after their ninth-grade year. Three of the 4 X 4 block principals (Craft, McCloud, and Fowler) agreed it was simple and that their schedule provided more opportunities to earn the state-required 23 credits. Principal McCloud stated it was easy math, "32 chances to earn their required credits is better than 28 chances." The three remaining principals stated that their advisement classes helped to ensure students remained on track and registered for the appropriate courses throughout their high school careers. Principals on the seven-period schedule identified two main strategies to ensure students stayed on track for graduation. First, the staff registers students for the correct courses each year with a well-maintained graduation plan. Principal Sermons was emphatic scheduling is the most critical component of keeping students on track in addition to continually monitoring students' schedules from year-to-year. Second, an effective grade repair and credit recovery program helped to ensure students are on track to graduate. Principals Leaf, Grayson, Chester, and Layton stated it is vital to have an effective grade repair and credit recovery program to provide multiple opportunities for students to earn their required credits. These principals noted that a student on a seven-period schedule has four fewer opportunities than the 4 X 4 block student to earn the required number of credits which might make the seven-period schedule more difficult to ensure students graduate on time.

### **Conclusion**

This study was an extensive and comprehensive examination of the primary schedule types (7-period and 4 X 4 block) utilized in Georgia high schools and how they affect ninth-grade student achievement and overall school performance measures. The relationship between the schedule type and school location (rural, suburban, and urban), as well as the percentage of students receiving free and reduced lunch was examined. Seven dependent variables were considered with schedule type and school location. Four dependent variables were examined with schedule type and the percentage of students receiving free and reduced lunch divided into quartiles. Twelve interviews with high school principals were conducted in order to confirm or refute the quantitative findings. Included in this study were the 384 brick and mortar public high schools in Georgia of which 154 schools use a 4 X 4 block schedule and 174 schools use a seven-period schedule.

Four research questions guided this study. Research Question 1 sought to quantify the difference between schedule types and school locations using mean scores from the Georgia Milestones End-of-Course assessments in 9<sup>th</sup> Grade Literature, Algebra I, and Biology. Research Question 2 attempted to quantify the relationship between the same independent variables (schedule type and school location) using the mean scores from overall school performance measures such as their CCRPI scores, school climate ratings, four-year cohort graduation rates, and overall retention rates. Research Question 3 used the percentage of students receiving free and reduced lunch divided into quartiles. Finally, Research Question 4 provided an understanding of whether a particular schedule type could increase ninth-grade student achievement and overall school performance.

As noted in the literature, the "ninth-grade bulge" contributes to the nation's steady decline in the graduation rate (Wheelock & Miao, 2005). The findings of this study could have substantial implications for high schools in Georgia and possibly across the nation.

In examining the quantitative results from this study, it is clear there is no significant difference in student achievement based on the use of either of the two types of schedules. Only two interaction effects were found to be significant when comparing school schedules combined with their location (rural, suburban, and urban). One of the significant findings when comparing mean scores on the Georgia Milestones Biology EOC indicated students that attended a 7-period day schedule in urban schools performed well below their counterparts in 7-period rural, 7-period suburban, 4 X 4 block rural, 4 X 4 block suburban, and 4 X 4 block urban schools. The other significant result was found when comparing mean CCRPI scores and FRL. Again 7-period urban schools performed well below 7-period suburban and 4 X 4 suburban schools. There was not a significant difference between 7-period urban schools and the three other combinations: 7-period rural, 4 X 4 block rural, and 4 X 4 block urban.

When examining the main effects of school schedules, only two significant results were found for research questions 1, 2, and 3. One of the significant results was found on sub-question 1b when comparing mean scores on the Georgia Milestones Algebra I EOC denoting 4 X 4 block schedule had significantly better scores than schools using a 7-period schedule. During the principal interviews, it was noted that most 4 X 4 Block schools institute a process that provides a math support course in the fall prior to the Algebra I course in the spring semester resulting in 90 minutes of math instruction for students. This increase in instructional time had a positive impact on student achievement as compared to the 7-period schedule. These results confirmed an earlier study by Ford (2015) in North Carolina.

The other significant result was connected to sub-question 3c comparing school climate ratings. Results indicated the 4 X 4 block schools had a significantly better climate rating than schools using a 7-period schedule. The interviews confirmed the results with most principals sharing their teachers and students were happier and less stressed on a 4 X 4 block schedule due to having fewer daily classes each day, fewer responsibilities, more time in each course, and more time for teachers to plan, prepare lessons, and assess student progress. It was also noted in the principal interviews the 4 X 4 block improved climate and culture by decreasing the number of transitions during the day limiting daily student interaction and providing fewer opportunities for negative behaviors. These results and insights confirm what was found in the literature.

There were two other main effects examined in this study. One main effect was based on school location (rural, suburban, and urban) and the other was based on the percentage of students receiving free and reduced lunch (FRL) measured in quartiles. As was expected both variables had a significant impact on student achievement and school performance. All sub-questions had significant and similar results when examining the main effect based on school location. Urban schools do not perform as well as rural and suburban schools on either the Georgia Milestones EOCs or the school performance measures. The data from this study confirmed the current literature and clearly showed the schools with smaller percentages of students on FRL outperformed the schools with the higher percentages of students on FRL. Principal interviews confirmed the FRL status did not affect the school culture, but does affect student achievement.

The study failed to indicate which schedule could lead to more significant gains in student achievement in the ninth grade or improve school performance overall. Although the findings were not conclusive in this respect, the study does provide information on which to make local decisions.

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