

ALGEBRA I PERFORMANCE IN YEAR-LONG VERSUS SEMESTER-LONG COURSES

Since the rise in popularity of the block schedule for high schools during the latter half of the 20th century, the benefits of block scheduling (where courses are taught in longer blocks of time per day, thus requiring only one semester) versus the traditional schedule (where courses last the entire year with shorter daily class periods) have been roundly debated. A comprehensive review of research on the effects of block scheduling by Zepeda and Mayers (2006) concluded that block scheduling has produced mixed results in terms of student achievement. Many block scheduling researchers have noted that student achievement is unlikely to be affected in an appreciable way under block scheduling unless there are concomitant changes in instructional practices that take advantage of the change in time format, since the total number of instructional hours in a block-scheduled course is essentially the same as in the traditional schedule.

As North Carolina transitioned to block scheduled high schools en masse during the 1970s and 1980s, the requirement that most students take and pass Algebra I in order to earn a diploma resulted in schools offering Algebra I in multiple formats. The goal of these accommodations was to better meet the learning needs of all students and to ensure that Algebra I did not become a roadblock to earning a high school diploma.

To that end, students in WCPSS take Algebra I in a variety of ways. While some take it in middle school, the majority take it for the first time in high school. In high school, it is offered as a Part I-Part II sequence, as a one-semester course, as a refresher course for students who have already taken it in middle school (called “Algebra Plus”), and even as an online course. In WCPSS, high schools differ in how they offer Algebra I - some offer only the one-semester option or the two-semester option, while others offer both.

Since Algebra I is taken in different ways in different high schools, and because those choices have implications for flexibility of scheduling and students’ elective opportunities, a study was undertaken to see whether high school students perform better academically in Algebra I if it is taken in a two-semester course versus a one-semester course.

ABSTRACT

This study examined differences in student achievement between 9th grade students who took Algebra I in a two-part, year-long sequence and those who took a one-semester Algebra I course. Results indicated higher proficiency rates and higher growth results for students in the year-long sequence, especially for students who scored below Achievement Level IV on their 8th Grade Mathematics EOG test. Schools are urged to use these results to make data-based scheduling decisions for 9th grade Algebra I students.

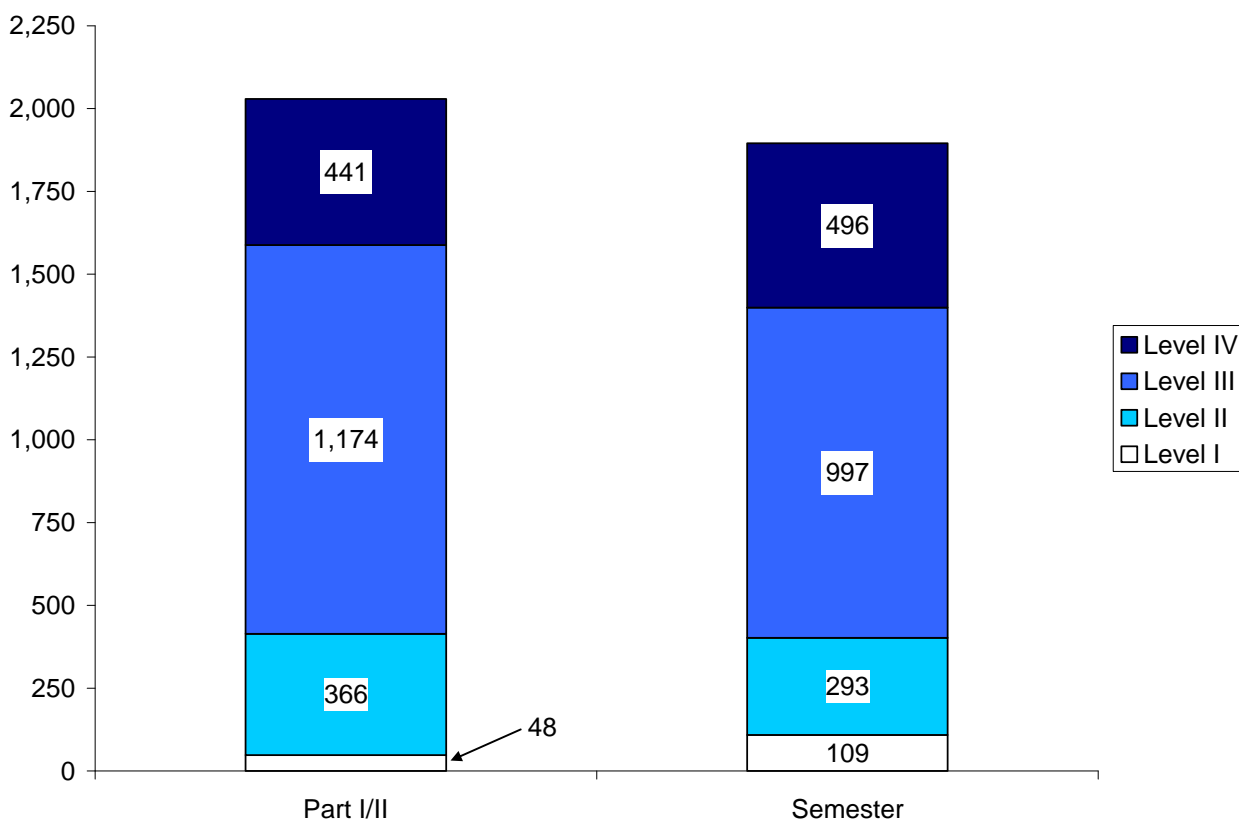
METHODS

This study utilized data from the 2007-08 school year. First, all WCPSS 9th graders who took Algebra I during 2007-08 were identified. Then from that group, students were retained for further analysis provided that they:

- took Algebra I in either a two-semester or one-semester format during 2007-08 at a block-scheduled high school (i.e., all except Broughton and Enloe),
- took the Algebra I EOC test at the end of that course,
- did not take Algebra I more than once during 2007-08,
- did not take Algebra I Plus,
- did not take Algebra I online, and
- had an 8th Grade Mathematics EOG test score on record

Given these criteria, a total of 3,924 9th graders were identified, with 2,029 (52%) having taken Algebra I in a year-long, two-part sequence and 1,895 having taken a one-semester course. In addition to being similar in size, the two groups of students were also similar in terms of their 8th Grade Mathematics EOC scores; 80% of the two-part Algebra I students had scored proficient in math in 8th grade, compared to 79% of the one-semester Algebra I students (Figure 1).

Figure 1
Distribution of Selected 9th Grade Algebra I Students by
Type of Algebra I Course and 8th Grade Math Achievement Level, 2007-08



This study then attempted to answer three questions:

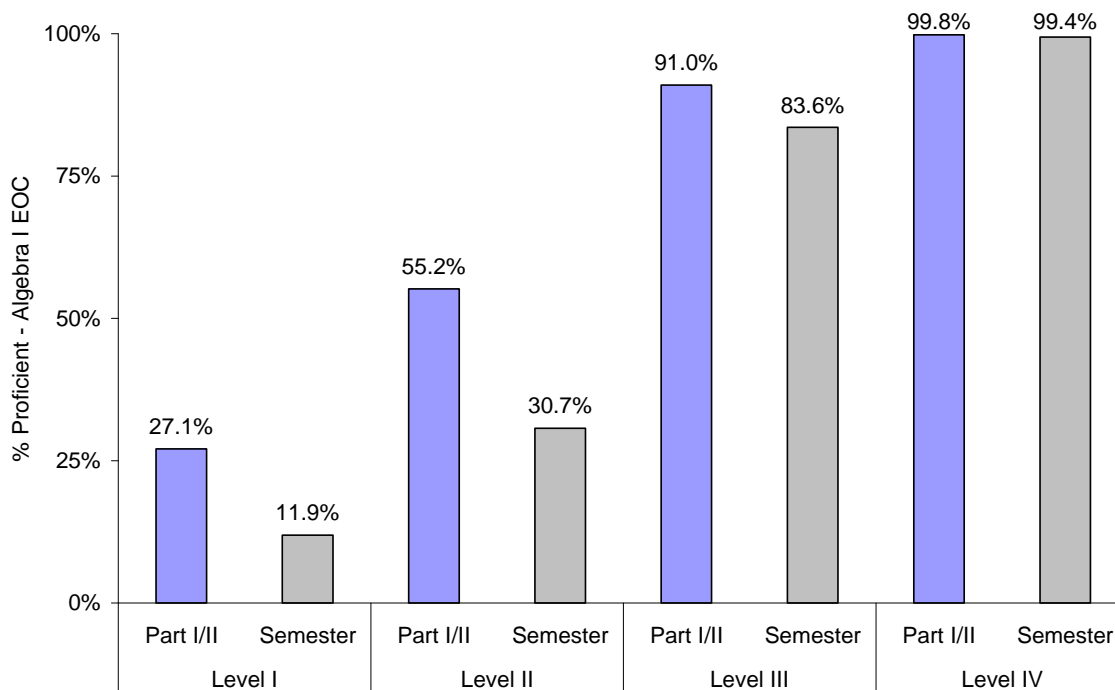
- Is there a relationship between Algebra I EOC *proficiency* and type of course?
- Is there a relationship between Algebra I EOC *growth* and type of course? and
- Does the relationship between Algebra I achievement and type of course vary depending on the incoming skill level of the student, as measured by the 8th Grade Mathematics EOG test?

RESULTS

Analysis of the percentage of students scoring proficient (i.e., at or above Achievement Level III) on the Algebra I EOC test revealed that students taking Algebra I in a two-part/two-semester sequence were significantly more likely to score proficient on the EOC than those taking it in one semester (85% vs. 75%; $\chi^2 = 56.07$, $p < .05$).

When examining this relationship based on students' 8th grade mathematics achievement, a more interesting pattern emerged. Specifically, the difference in proficiency rates appeared to be largely relegated to those students who scored below Achievement Level IV on the 8th Grade Mathematics EOG test (Figure 2). In other words, schedule type did not appear to affect a student's propensity to score proficient on the Algebra I EOC provided that she/he scored in Level IV in 8th grade; however, students who scored Level III or below in 8th grade were much more successful in the two-part/two-semester Algebra I course.

Figure 2
Algebra I EOC Proficiency by
Type of Algebra I Course and 8th Grade Math Achievement Level, 2007-08

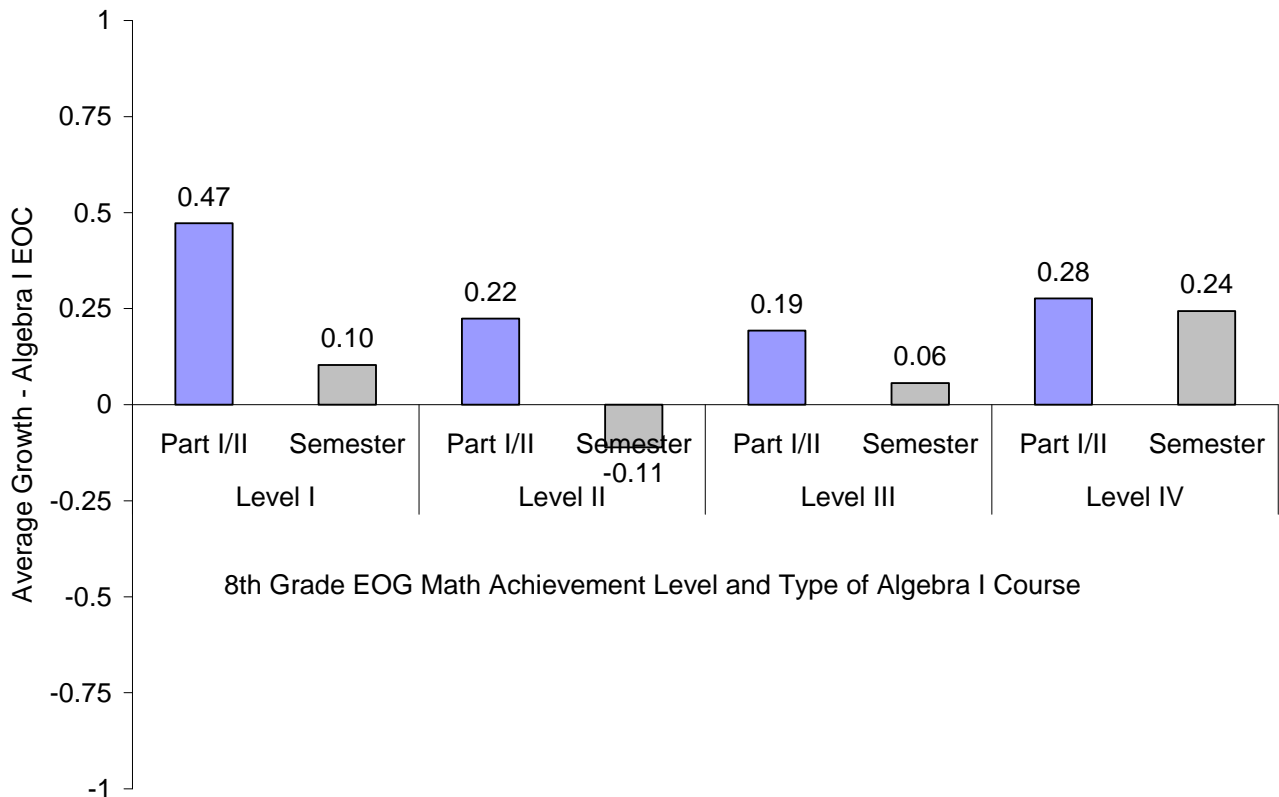


8th Grade EOG Math Achievement Level and Type of Algebra I Course

In part because the Algebra I proficiency results could have been affected by the small difference noted in the 8th grade achievement levels of the two groups, analysis of Algebra I growth results was also conducted. Results of the growth analyses were very consistent with the proficiency results. Students taking Algebra I in a two-part/two-semester sequence demonstrated significantly higher average growth scores than those taking it in one semester (.22 vs .08, $t = 7.59$, $p < .05$). In other words, students in the two-part/two-semester sequence made significantly more progress in Algebra I (relative to how well they scored in 8th grade) than their peers in the one-semester course.

When examining this relationship based on students' 8th grade mathematics achievement, the pattern seen in the aforementioned proficiency results appeared again. The overall difference in average growth scores was largely accounted for by students who scored below Achievement Level IV on the 8th Grade Mathematics EOG test (Figure 3). There was a small numeric difference favoring the two-part/two-semester students in the Level IV group as well, but unlike the other groupings, the difference was not statistically significant ($t = 0.96$, $p < .37$).

Figure 3
Algebra I EOC Growth by
Type of Algebra I Course and 8th Grade Math Achievement Level, 2007-08



Note: The zero line on the Y axis corresponds to the state's benchmark for Expected Growth under North Carolina's ABCs Growth Model. See <http://www.ncpublicschools.org/docs/accountability/reporting/abc/2007-08/academicchange.pdf> for more information.

SUMMARY

The results of this study suggest that a two-part/two-semester Algebra I sequence for 9th graders may in fact produce higher achievement – both in terms of proficiency and growth – than a one-semester course for those students who enter high school without a Level IV score on the 8th Grade Mathematics EOG test. These data should help schools to schedule 9th graders for Algebra I in such a way as to ensure that each of them has the best opportunity for success. In the future, this cohort of students will be followed to examine whether the differences in performance identified here persist in terms of achievement and mathematics course-taking patterns later on in high school.

REFERENCES

Zepeda, S. J., & Mayers, R. S. (2006). An analysis of research on block scheduling. *Review of Educational Research*, 76, 137-170.