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THE IMPACT OF UNIVERSALLY ACCELERATING EIGHTH GRADE MATHEMATICS STUDENTS IN HETEROGENEOUSLY GROUPED CLASSROOMS: AN INTERRUPTED TIME SERIES

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ABSTRACT

THE IMPACT OF UNIVERSALLY ACCELERATING EIGHTH GRADE MATHEMATICS STUDENTS IN HETEROGENEOUSLY GROUPED CLASSROOMS: AN INTERRUPTED TIME SERIES

Patrick T. Walsh

Traditionally, students are scheduled to take Algebra I in their first year of high school mathematics in New York State. However, in many schools, the "top" students in a cohort have access to this course in eighth grade, tracking these high-achieving students ahead of their lower-achieving peers. In response, some schools have adopted the policy of "Algebra for all" in eighth grade – called universal acceleration. A perceived benefit to the policy of universal acceleration is ensuring equal access to a challenging curriculum for all students, regardless of race, socioeconomic status, or prior achievement-mitigating one of the perceived limitations of ability tracking. A drawback of an "acceleration for all" policy is that weaker students may not be developmentally ready to take Algebra in 8th grade, while at the same time, stronger students' progress might be hindered. The purpose of this descriptive, quantitative study is to investigate how the implementation of acceleration for all has impacted the timing of when students take the Integrated Algebra Regents in one school district, the district's achievement on the Integrated Algebra Regents and whether the policy affects subgroups of students differentially. The results from the study will be significant to school leaders, as districts may wish to consider these policy changes to enhance learning opportunities for all students.

DEDICATION

This is dedicated to my amazing wife and best friend, Kristen, and to our son, Hudson. The two of you have both made great sacrifices so that this could become a reality, and for that, I am truly thankful. Your constant and unwavering support during this process is something I will never forget and deeply appreciate. I am still not sure how I got so lucky to have you in my life. I look forward to all that we continue to accomplish in this life together, because we truly are a team. Everything that is great in my life is a product of you both. Thank you for being you, I will love you always.

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CHAPTER 1: INTRODUCTION

In New York state, one of the requirements for graduating with a Regents Diploma is a passing score on the Algebra I Regents. Most schools in New York State offer this first-year high school course in eighth grade to only their top students, usually decided by a combination of the student's prior academic achievement and school recommendation. Students in this track are considered "accelerated" and are on a direct path to take calculus as a senior in high school. The other students in the cohort take the Algebra I course in 9th grade and can only progress to a pre-calculus course by senior year. To increase equity and access for all students, some schools have adopted "Acceleration for All" policies, assigning all students in eighth grade to the Algebra I curriculum.

As early as middle school, schools commonly group students into "tracks" based on prior academic achievement and school recommendation. In most cases, learners are sorted into two and sometimes even three different tracks, based on their prior academic performance and other locally determined criteria. It is most common to have an advanced track (takes Algebra in 8th grade) and a second track and/or third track containing all other students (takes Algebra in 9th grade). In this system, similarly able students are placed together, with the hope that by doing so, instruction can more effectively be catered to the level of the students in the classroom. The "acceleration for all" movement is an attempt to provide an equal experience for all students, regardless of their prior achievement or demographics. It also is a response to counter some of the negative effects of tracking, by ensuring that all students have an equal access to the most rigorous courses that a school offers.

Sorting students into tracks by ability disproportionally effects minority students and students of low socioeconomic status, since these students are, on average, often the ones overrepresented in the "lower" tracks (Braddock, 1990; Oakes, 1990). Thus, these students not only start behind, but are continuously working at a deficit compared to their more "able" peers and cannot attain the same high-level training. While universal acceleration will not necessarily alleviate all of the stratifications that result in tracking (as some schools still group students by ability even when they accelerate all students) it does increase access and opportunity for all students to reach the most rigorous and challenging mathematics courses the district offers.

Purpose of the Study

Using student level data from one Long Island, New York school district, this descriptive, quantitative study analyzed the impact of a universal acceleration policy on the timing of when a student took the Integrated Algebra Regents Exam, across the general population and across racial subgroups. As well, student achievement outcomes on the Integrated Algebra Regents exam before and after adopting a "Universal Acceleration" policy were analyzed. Specifically, the researcher will compare the Integrated Algebra Regents scores of cohorts prior to implementation and post implementation, across the general population and across racial subgroups.

Significance/Importance of the Study

A study on universal acceleration will help inform school leaders on whether it is more equitable and effective to provide early, equal mathematics opportunity for all students. Many educators believe that United States students' disappointing results on the Trends in International Mathematics and Science Study (TIMSS) and other international

comparisons are largely due to how, when, and to whom Algebra is taught to in schools. Studies indicate that in this country, 8th grade mathematics emphasizes arithmetic over algebra, compared to other international counterparts such as Japan and Singapore, where most students in 8th grade mathematics are taught a rigorous course in higher level mathematics (Thinking Algebraically, 2008). Moreover, the American practice of tracking students by ability, sometimes starting as early as the elementary level, may prohibit some students from access to the higher-level courses that are beneficial to their long-term academic growth.

Every Student Succeeds Act (ESSA) was signed into law by President Obama in 2015. The law outlines multiple provisions that will help ensure success for students and schools. One of the provisions is that the law "Advances equity by upholding critical protections for America's disadvantaged and high-need students" (Every Student Succeeds Act, n.d.). This study of universal acceleration may also reveal ways in which achievement gaps can be reduced or eliminated for subgroups of students on the Algebra I Regents Exam. There are clear gaps in proficiency rates on the Algebra I Regents Exam for minority students, students of low socioeconomic status, and special education students, as evident from data taken from the 2018 New York State Report Card (NYSED Data Site, n.d.). The proficiency level (65 or higher) on the Algebra I Regents in 2018 for all students in New York State was 70%. That number drops for black students (53%), Hispanic students (57%), Economically Disadvantaged Students (60%), and Students with Disabilities (39%). In New York state, "economically disadvantaged" students are defined as those students who participate in, or whose family participates in, economic assistance programs, such as the free or reduced-priced lunch program, among

others (Assessment Glossary: NYSED Data Site., n.d.). That same year, 33% of all students in New York State earned a Regents with Advanced Designation (a signal that the student has passed eight Regents Exams across various subjects, three of them in mathematics), compared to only 12% of black students, 16% of Hispanic students, 19% of Economically Disadvantaged students, and 3% of Students with Disabilities. This advanced diploma is also is an indication of not just achievement, but access, as not all students continue with Regents level mathematics after Algebra I, as the Regents with Advanced Designation is not a graduation requirement.

On the other hand, it is also conceivable that tracking students by ability might be beneficial to all students. Higher achieving students can benefit from classes that routinely design challenging and rigorous learning opportunities, and lower achieving students might benefit from a pace of learning that is more appropriate to their ability level at that given point in time. There is also concern that having all students accelerated could "water" down the course, thus depriving higher achieving students of a rigorous mathematics experience. In addition, exposing students to Algebra before they are developmentally ready could stunt the student's mathematical development, confidence, and enjoyment of the subject, thus discouraging them from taking four years of high school mathematics. The purpose of this study is to explore the relationship in providing early, equitable access to the most challenging course 8th graders are provided and determine the impact on student achievement outcomes.

Connection with Social Justice and/or Vincentian Mission in Education

The goal for any educational institution should be to provide enriching and optimal learning experiences for all students. When given a diverse set of learners,

schools need to decide which grouping practices will yield the best outcomes for students. A concern with tracking students by ability and restricting curriculum access to certain groups of students has historically led to minorities and students of low socio-economic status being placed in the lower tracks and less rigorous courses, harming their academic trajectories (Braddock, 1990; Oakes, 1990). This research will examine whether universal acceleration is associated with increased achievement for all students, and whether there is a noticed benefit for historically marginalized subgroups of students in terms of both participation and achievement. The goal of this research is to act as the impetus for schools to consider how their grouping decisions influence equity, access, and achievement.

Research Questions

This study answered four research questions:

1. To what extent did the implementation of a universal acceleration policy affect the timing of students' Integrated Algebra Regents test taking?
2. Did the implementation of a universal acceleration policy disproportionately affect the timing of students' Integrated Algebra Regents test taking of any racial subgroup?
3. To what extent are there differences in Integrated Algebra Regents exam scores between pre-universal acceleration and post-universal acceleration in this school district?

4. To what extent do the differences in Integrated Algebra Regents exam scores between pre-universal acceleration and post-universal acceleration differ by racial subgroup?

Definition of Terms

Tracking: "The practice of dividing students into separate classes for high, average, and low-achievers" (Oakes, 1985).

Universal Acceleration: All students in a cohort take Algebra I in 8th grade.

Heterogeneous Grouping: Students of varying ability levels are placed in the same instructional setting for learning.

Homogeneous Grouping: Students are sorted for instruction based on prior achievement or perceived academic capability, in order to create groups containing students of similar academic aptitudes.

Between-class grouping: a school's practice of separating students into different classes, courses, or course sequences (curricular tracks) based on their academic achievement (Research Spotlight on Academic Ability Grouping., n.d.).

CHAPTER 2: REVIEW OF RELATED RESEARCH

Introduction

This section will present existing literature on the impact of an "acceleration for all" policy on student achievement. Theoretical frameworks rooted in both Marxist principles and Learning Theory will be related to the concept of universal acceleration and ability grouping. Then, a history of tracking in the United States demonstrates how the American education system may have contributed to decreases in equity and access of curriculum for all students. Federal and state educational policy will then be reviewed, to provide a framework for how schools have been influenced by political forces. Prior research will be presented that demonstrate the impact on student achievement based on sorting students by ability compared to accelerating all students and heterogeneous grouping. Within each of the studies, there will be an attempt to associate whether sorting mechanisms impact student achievement and access, and further, whether this association differs for certain subgroups of students.

Theoretical Framework

Those against tracking claim the procedure exacerbates inequalities among subgroups, as in many cases, minority students and students of low socio-economic status are overrepresented in the lowest track. Others propose that tracking helps students, since educators can tailor instruction to best meet the needs of all their students, since similarly able students are clustered together. Such structures allow the class to move at an appropriate pace and difficulty level. The following two positions have different underlying theoretical motivations.

Marxist View on Education. The Marxist perspective on education is founded on the belief that the education system maintains the capitalist system and the class struggle, and is based on the ideas from Karl Marx, a German sociologist. Marx looked at society as a constant conflict and imbalance between classes within society. He views education as an institution that emphasizes and exacerbates the differences in the class system, by maintaining the classes of the ruling class and the working class. As a result, Marxist sociologists are of the view that the curriculum and the education system is unfair, oppressive, lacks relevance, and promotes social inequalities (Samkange, n.d.). In tracked educational settings, minority students and students of low socio-economic status are often over-represented in the lower tracks. (Braddock, 1990; Oakes, 1990). These lower tracks are often characterized by poor academic achievement, low student expectations, and behavioral problems. Compared to students in the advanced track, who have access to a challenging curriculum with high expectations, the educational experience is often a result of the track a student is placed into. Thus, the gap in opportunity, access, and achievement for minority students and students of poverty can be exacerbated by the school setting. Universal acceleration is one response to tracking, ensuring that all students enter high school having the same mathematical training regardless of their ethnicity and socio-economic status. While the Marxist view may be considered extreme (critics of the Marxist view would argue that education has opened social and economic opportunities for marginalized groups, not limited them), the ideas founded in Marxism remain a reminder to continually seek out areas that promote inequality and strive to correct them.

Two other theorists have research related to Marxist principles. Amy Gutmann (1987) explains that educational resources should be allocated in a manner that provides adequate democratic participation, allows for choice in pursuing different conceptions of good lives, and promotes the identification with and participation in the larger society as well as its smaller sub-communities. Gutmann's focus on adequacy in the distribution of certain education resources is illustrated in the Democratic Threshold Principle. The Democratic Threshold Principle provides constraints on the Democratic Authorization Principle, which allows democratic institutions discretionary authority to determine educational inputs. Once the democratic threshold is met, democratic institutions may allocate resources above the education threshold (Pijanowski, 2015). This theory is taken a step further by John Rawls. In *A Theory of Justice*, Rawls (1971) proposes two main principles. The first principle is that every person has an equal right to basic liberties. Secondly, social and economic inequalities should be arranged so that the greatest benefit goes to the least advantaged, and opportunities are open to all (Pijanowski, 2015). In a Rawlsian society, in which public schools have been tasked with providing academic and social skills, there is a responsibility on the part of the institution to ensure that these educational opportunities are available to all in accordance with Rawls First Principle of Justice. As it relates to universal acceleration, Rawls would argue that opening access to Algebra I for all students in 8th grade would be a step in the right direction in ensuring that marginalized subgroups of students are not being left behind and are given opportunities and access to succeed.

Learning Theory. Focusing on the most optimal conditions for learning may lead to a different conclusion about tracking. While Marxist principles promote the concept of

universal acceleration, Vygotsky's Zone of Proximal Development (ZPD) argues that learning occurs when students are pushed right outside of the area of the things they currently know, and into a region where they can learn a skill with the right supports and interventions. This zone is vastly different for all students; therefore, Vygotsky might argue that students should be sorted into classes of similarly able students so that they can be routinely pushed into their appropriate "zone." Vygotsky developed the concept of the Zone of Proximal Development (ZPD) as: "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peer" (Shabani, Khatib, & Ebadi, 2010, p. 238). This "zone" begins with the current attainability level of the student and extends to what they are capable of learning with the right supports. The idea is that individuals learn best when working together with others during collaboration, and it is through such collaborative endeavors with more skilled persons that students learn and internalize new concepts, psychological tools, and skills. In a universally accelerated classroom, Vygotsky would argue the gap between the highest achieving student and the lowest achieving student is too vast and it would not be possible to provide an educational setting in which all students in the class could be challenged in accordance with their ZPD. Lower achieving students would be presented with material that is too challenging, and higher achieving students would not be receiving instruction that pushes them past their potential. Rather, grouping students with similarly able peers (tracking only top students into Algebra I in 8th grade) will be beneficial to all students, so they may challenge each other at appropriate levels and therefore, improve academic outcomes.

Thus, it would be more appropriate to track students for Algebra I so they can routinely "push" each other into their ZPD.

Review of Related Literature

Concepts rooted in Marxist principles and the Zone of Proximal Development will be overarching themes as universal acceleration and tracking will be discussed through the literature review. Historical rationale for determining curricular access via tracking and empirical studies that both validate and challenge those tracking practices will be included in the review of the literature. Within each of these studies, it will be revealed which, if any, subgroups of students tend to benefit most from tracking, and identify certain groups where tracking led to detrimental effects.

History of Ability Grouping/Tracking. In the beginning of the 20th century, the United States' economy was shifting from an agrarian to an industrial base, and the demand for a high school education increased sharply. An influx of immigrants also led to an increase in the student population in schools, creating a diverse (ethnically and academically) cohort of students. Numerous political, social, economic, and intellectual factors led to the concept of a comprehensive high school - one that offered distinct curricular tracks but promised a common set of educational experiences and a single diploma type for all graduates (Loveless, 1998).

During this transition, the rationale for tracking in America was a result of three forces: (a) differentiated, hierarchal curriculum structures, (b) school cultures committed to common schooling and accommodating differences, and (c) political actions by those in positions of power to affect the overall structure of the system. An academic track for college bound students was created, and vocational tracks were created for those students

who were viewed as "non-academic." The high track was made up with college-preparatory or honors courses that prepared students for study at a college or university and were often populated by students from advantaged communities. A general track served as a catch-all for the students in the "middle." Finally, the low track consisted of vocational courses and a small amount of low-level academic course offerings, serving low functioning and indifferent students (Loveless, 1998).

The college-general-vocational tracking system of the early 1900's has given way to a more popular form of tracking today, where students are grouped between classes-independently from subject to subject into general or advanced courses, sometimes referred to as levels. Today, since significantly more students are expected to attend college, more students are placed in an academic track. However, in most cases, students are still sorted and grouped based on ability and school defined criteria. Wheelock (1994) explained that in schools where students are "leveled" into advanced, honors, standard, or basic courses, they are exposed to vastly different curricula based on the label. Students placed in a low-level track early on in their academic career often have fewer opportunities to learn or enroll in advances courses, which prepare them for post-secondary study. While more students overall have access to the academic track, the practice of sorting students by ability is still highly prevalent.

Various historical events have led to increased diversity within the educational system, and thus tracking students became a way for schools to maintain forms of segregation despite legal desegregation. Legislative efforts such as *Brown v. Board of Education of Topeka* and the Individuals with Disabilities in Education Act (IDEA) in 1975 gave educational rights and equity to minorities and students with special needs,

however tracking systems can mitigate some of these attempts at equity. On the other hand, the Russian Launch of Sputnik in 1957 created panic within the American education system, as many now felt American students were not being educated enough, were not working hard enough, and were not keeping pace with international students. To ensure that American students remained competitive on a global scale, the notion of separate programs for advanced students came to the forefront. In the 1960's, programs for gifted youngsters increased, especially in math and science (Loveless, 1998). The increase in diversity in American schools, coupled with the demand for American students to remain competitive with their international counterparts, created pressure within schools to devise a way to educate all students in the most effective way.

Today, it is most common for districts to offer Algebra I only to their "top" students in 8th grade. In this model, higher achieving students are accelerated and are on a path to take calculus as a senior in high school. The rest of the cohort takes Algebra I in 9th grade and does not have a chance to progress to calculus by their senior year. To increase equity and access, some schools have decided to universally accelerate their 8th grade students in mathematics. This practice has racial implications. In their study of 8th grade Algebra participation rates in the United States, Patrick, Socol, and Morgan (2020) found that black and Latino students were not fairly represented in 8th grade Algebra. Black students make up 15% of the eighth-grade student body in the United States, but only 10% of students enrolled in eighth grade Algebra I nationwide. Similarly, a quarter of eighth graders are Latino, but only 18% of the students enrolled in eighth grade Algebra I are Latino.

Universal Acceleration. The concept of universal acceleration refers to the practice of having all students in a cohort take the first year of high school mathematics, Algebra I, in 8th grade, rather than just the "top" students taking it in 8th grade. Universal acceleration is one attempt at mitigating the effects of tracking, by ensuring that all students, not just a select few, have access to the most challenging courses a school offers.

Burris and Welner (2005) describe how one suburban school raised achievement levels for all students by de-tracking and universally accelerating all eighth-grade students in Algebra. In the district, Hispanic (58%) and black (38%) students were overrepresented in the lower tracked classes. Their policy change offered accelerated math classes to all students, beginning with the 1999 eighth grade cohort, in heterogeneously grouped classrooms, compared with previously only offering the course to the highest achieving students. After universally accelerating students in heterogeneously grouped classrooms, 90% of students entered the high school in 9th grade having passed that Regents examination. Between 1995 and 1997, only 23% of regular education black and Hispanic students passed this exam. After universally accelerating and grouping heterogeneously, that number tripled to 75%. By the time the cohort of 1999 graduated in 2003, the achievement gap had shrunk dramatically. 82% of all Hispanic and black students and 97% of white and Asian students had earned Regents Diplomas. Additionally, when controlling for prior achievement and socio-economic status, minority students' enrollment in trigonometry, precalculus, and Advanced Placement calculus all increased. The enrollment gap for these cohorts decreased from

38% to 18% in five years, and the AP Calculus scores significantly increased ($p < .01$) (Burris & Welner, 2005, p. 598).

Dougherty, Goodman, Hill, Litke, and Page (2015) explain how district leaders in the Wake County Public School system were looking to increase the number of students taking Algebra in 8th grade, as they observed that the demographics of those 8th graders taking advanced courses did not match their district's demographics as a whole. The district ultimately implemented a targeted enrollment strategy, starting in the 2010-11 school year, that identified students eligible for accelerated math using a prediction model, rather than leaving the choice to individual school recommendation. By doing so, the number of middle school students in accelerated math rose from 40 percent to nearly 70 percent within two years of the policy's implementation. As well, students who otherwise would have been omitted from Algebra in 8th grade were now being selected in a fairer way. Their findings showed that the new assignment rule substantially diminished income and race gaps in course assignment, compared to the prior discretionary policy of determining acceleration. They also found that middle school math acceleration improves college readiness scores and college aspirations, increasing the fraction of students intending to enroll in four-year colleges by over 20 percentage points. The study further explained that acceleration in 7th grade increases the marginal student's access to pre-calculus in 11th grade, with the most dominant effect for females and non-low-income students (Dougherty, Goodman, Hill, Litke, & Page, 2015). It is worth noting, however, that only one-seventh of the accelerated cohort remained in the accelerated track by the 11th grade, indicating a large attrition rate for remaining in the advanced track.

Not all instances of universally accelerating 8th grade students in mathematics yielded overwhelmingly positive results, however. Allensworth, Nomi, Montgomery & Lee (2009) explain how in 1997, the Chicago Public Schools implemented a policy that required Algebra for all ninth-grade students, eliminating all remedial coursework. This policy increased opportunities to take Algebra for low-skill students who had previously enrolled in remedial courses. The study used six cohorts of ninth-grade students- three pre-policy and three post-policy cohorts from 1994 through 1999. By 2000, the participation rate in College Preparatory Math was 97%. However, they found that an increase in Algebra I enrollment by 20 percentage points resulted in a 10% increase in students' earning Algebra credit in 9th grade, which is consistent with an observed pass rate of 50%. Math failure rates increased among low-ability students and average-ability students, and students were not more likely to take advanced math classes beyond Algebra II post policy. Math scores for higher achieving students were 2.04 points higher in schools that offered remedial courses pre-policy rather than Algebra for all. When revisited in 1998, after implementation, schools that already had Algebra for all prior to implementation showed math score increases of 3.84 and 4.18 respectively in 1998 and 1999. The schools that did not offer Algebra for all pre-policy improved by only 1.64 and 1.44 respectively in 1998 and 1999 (Nomi, 2012). The policy did not have statistically significant effects on math scores on the first year of policy implementation. Although more students completed ninth grade with credits in Algebra and English I, failure rates increased, grades slightly declined, test scores did not improve, and students were not more likely to enter college (Allensworth, Nomi, Montgomery & Lee, 2009).

Domina, Penner, Penner, & Conley (2014) outline how the Towering Pines School District (pseudonym) undertook change to intensify its 8th grade mathematics curriculum and increase the number of students in Algebra I between the 2004-2005 and 2007-2008 school years. During this period, the proportion of 8th graders taking Algebra I increased from 32% to 84%. They looked to answer three specific research questions. Firstly, they explored to what extent the curriculum intensification changed mathematics course enrollment patters in the district. Secondly, how the achievement distributions in the math classrooms changed as the district universally accelerated 8th graders into Algebra I. Finally, they explored how student achievement changed after universally accelerating students into 8th grade Algebra. Their findings showed that universal acceleration had a strong impact on course selection. Prior to implementation, a hypothetical student had a 43% chance of enrolling in Algebra in 8th grade, compared to a 94% chance after this curricular intensification. However, even as the district implemented a universal acceleration policy, mathematics achievement growth between 6th and 10th grade slowed, and the achievement advantages associated with 8th eighth grade Algebra declined. Students in the 2006–2007 and 2007–2008 eighth grade cohorts scored approximately 0.15 standard deviations lower on the 10th grade math test than their peers in the 2004–2005 cohorts. (Domina, Penner, Penner, & Conley, 2014) This district provides a cautionary tale on how a universal acceleration policy might increase inclusiveness and opportunity, but also impede student achievement if not done correctly.

The Case for Heterogeneous Grouping as it Relates to Student Achievement.

Universally accelerating students in heterogeneously grouped classrooms is a way for schools to ensure that all students, not just a select few, have access to the most

rigorous and challenging courses that a school offers. This section will analyze empirical studies that investigate heterogeneous grouping and how the practice relates to student achievement.

Atteberry, et. al. (2019) analyzed one Long Island, New York school district's de-tracking effort and the impact it had on participation in advanced courses and overall student achievement. As a result of moving to heterogeneous grouping, they found that there was increased participation in their International Baccalaureate (IB) courses following their de-tracking efforts, particularly among students with lower PSAT scores. As well, they found that de-tracking was not associated with lower mean mathematics scores for any group in the study. The school's higher achievers continued to succeed in heterogeneously grouped classrooms, and average IB scores for the school's lower achievers were the same or higher after de-tracking began, even with increased numbers of students participating in these courses.

Leonard (2001) focused on mathematics achievement in a study including 177 sixth-grade mathematics students enrolled in a suburban elementary school over the course of two years. The researcher collected achievement data from her own classroom of students using the Maryland Functional Mathematics Test-Level I (MFMT-I) and administered a pretest and posttest. The results of these assessments were used to determine whether the way in which students were grouped had an influence on mathematics achievement. During year one, the students were grouped heterogeneously, and during year two the students were grouped homogeneously. Students were assigned to an ability group based on their results from the MFMT-I pretest. The heterogeneous

cohort consisted of sixteen low ability, thirty-four middle ability, and forty-three high ability students, and the homogeneous cohort contained thirty-seven low ability, twenty-nine middle ability, and twenty-eight high ability students. Results showed that there were significant effects between the posttest scores of students in the heterogeneous and homogeneous groups. The low-achieving and middle-achieving students scored significantly higher in the mixed ability group than students in the homogeneous groups.

Proponents of heterogeneous grouping argue that those in the top track are at a distinct advantage compared to their peers. To verify this belief, a longitudinal study of the effects of ability grouping on students' growth in academic achievement was studied at five public high schools and one Catholic high school in a Midwestern city, and a single public high school in an adjacent city. The analysis predicted the achievement of students with different combinations of characteristics, had they been placed in the Regular group, had they been placed in the Honors group, and so forth. It should be noted that students enrolled in special education course or English as a Second Language course were excluded from the data. The results show that generally, students would benefit from being placed in a higher-level course. The researchers noted the model was less effective when comparing movement from tracks further away, however, predicted mean score increased in mathematics for every upward track level. Conversely, students in the “Advanced” group had a mean score of 92.2 (SD = 8.2). If they were placed in the “Regular” group, their predicted mean score would increase to 94.5 (SD = 8.9) (Hallinan, Bottoms, Pallas, and Palla, 2003). This helps counter the idea that high achieving students would be disadvantaged by being in a class with less able students. These findings demonstrate that students would benefit from the greater learning opportunities

that are characterized by higher ability groups and magnify the achievement gaps that exist in tracked settings.

When students are grouped for instruction by ability, it can lead to significant achievement gaps in student achievement for those students placed in the lower track. To examine the degree to which exposure to within-class grouping for reading instruction from kindergarten to third grade is predictive of students' reading test scores and English coursework in the middle grades, Buttaro Jr. and Catsambis (2019) used data from the Early Childhood Longitudinal Study–Kindergarten Cohort (ECLS–K). The sample consisted of 7,800 students with data for fall of kindergarten, and spring of kindergarten and first, third, fifth, and eighth grades. The findings showed that when compared with similar students who were ungrouped in the early grades, those in high-ability reading groups have higher achievement scores, whereas those in low-ability groups have lower test scores in every grade from kindergarten to the eighth grade. In addition, compared with their ungrouped counterparts, students in low-ability groups in the early grades are more likely to enroll in below grade level English classes when they get to 8th grade, whereas those in high-ability groups in these grades are more likely to enroll in advanced 8th grade English classes. Achievement gaps between previously grouped and ungrouped students widen with every additional year of exposure to ability grouping.

The Case for Homogenous Grouping as it Relates to Student Achievement.

Homogenous grouping is a common instructional practice where students are sorted into classes based on their prior abilities, achievement, and other local criteria determined by the school. In this model, similarly able students are sorted together to streamline instruction and create conditions where the ability level of the class is as

similar as possible. Proponents of tracking argue that by sorting students by ability, classroom instruction can more easily tailored to the level of the class. As well, higher achieving students can "accelerate" their learning, while struggling students can get the necessary supports that they need in their classes. As a result, all students would benefit from taking classes will other similarly abled peers. This section will analyze empirical studies that investigate homogeneous grouping and how the practice relates to student achievement.

The Trends in International Mathematics and Science Study (TIMSS) is an international comparative study of student achievement used to measure the mathematics and science knowledge and skills of 4th- and 8th-graders over time, in comparison to students around the world. In 2015, the average scaled score for 8th grade students in the United States was 500, which placed them 10th overall, behind countries such as Singapore, Korea, Russia, and Japan (National Center for Education Statistics (NCES) Trends in International Mathematics and Science Study, 2019). Concerns over American students' performance compared to international students has increased pressure within the American school system to help produce students that can better compete globally with international students. Many proponents of tracking would argue that by sorting students, top students are challenged in ways that will help them compete with students across the world, while struggling students can get the support they need to succeed to their optimal potential. The empirical studies that follow outline instances where grouping students by ability yielded positive results.

Collins and Gan (2013) used student level data from the Dallas Independent School District (DISD) to identify the effect of tracking on student performance across different

subgroups of students. They examined all third-grade students in the 2003-2004 school year who became fourth graders in 2004-2005, a total of 9,325 children from 135 different schools in Dallas ISD. When using the students' Texas Assessment of Knowledge and Skills Math mean and gain scores as dependent variables, the results suggest a positive, statistically significant relationship between the sorting variable and math score/gain score, indicating that, sorting is beneficial to students. To test for the possibility that grouping students only improves outcomes for higher achieving students at the expense of lower achieving students, the researchers ranked students according to their previous year test score, created dummy variables for high and low scoring students, and allowed the sorting effect to vary across the two groups. While the results suggest slightly higher effects for high achieving students, the estimates for the two groups are not statistically significantly different from each other. Both groups of students experienced gains in achievement in tracked settings (Collins and Gan, 2013).

Certain subgroups of students might benefit more from ability grouping than others. Robinson (2008) explored the influence of ability grouping on kindergarten and first grade reading on Hispanic Language Minority students. Using data from the ECLS-K, which is nationally representative and contains 21,400 longitudinal student level records, the researcher gathered data from 9,196 kindergarten students: 7,095 from public school and 2,101 from private school. Students who did not possess sufficient English proficiency by entry into kindergarten were excluded from the study, which omits many students on the lowest end of English proficiency. Results showed that LM/P (Language Minority students whose first language at home is not English) Hispanic children in ability grouped kindergarten settings gain 0.14 points per month more than ability-

grouped white children and 0.62 points per month more than non-ability-grouped LM/P Hispanic children. For ability-grouped LM/P Hispanic children, a full school year of ability grouping in kindergarten equates to learning 5.95 points more than their non-ability grouped LM/P Hispanic counterparts, as well as closing the LM/P Hispanic-white achievement gap by 1.34 points among ability-grouped students (Robinson, 2008).

Kulik and Kulik (1992) investigated the effects of cross-grade grouping programs on student academic achievement. Cross-grade grouping is similar multi-level grouping in that students of different ability levels are taught in separate classrooms. But in cross-grade plans, students move up or down to the appropriate grade level for instruction. Fourteen studies investigated effects of such cross-grade programs. They found that cross-grade grouping programs had a positive effect on students' academic achievement with an overall effect size of Cohen's d = .30 (the average effect was 0.12 for the high-ability students; -0.01 1 for the middle-ability students; and 0.29 for the low-ability students). Low ability students saw the highest effect size on academic achievement compared to high-ability and middle-ability students.

Tracking Having Little to No Effect.

Slavin (1990) performed a comprehensive review of 29 studies related to tracking in education and the impact on student achievement. The article used a review procedure which incorporated the best features of meta-analytic and traditional reviews. Six studies used random assignment of students to ability-grouped or heterogeneous classes. Nine studies took groups of students, matched them individually on IQ, composite achievement, and other measures, and then assigned one of each matched pair of students to an ability-grouped class and one to a heterogeneous class. The remaining 14 studies

investigated existing schools or classrooms which used or did not use ability grouping, and then either selected matched groups of students from within each type of school or used analyses of covariance or other statistical procedures to equate the groups. Slavin's findings showed little to no impact of ability grouping on student achievement. The median effect size for the 20 studies from which effect sizes could be estimated was -.02, and none of the nine additional studies found statistically significant effects. Results from the 15 randomized and matched experimental studies produced similar results; the median effect size was -.06 for the 13 studies from which effect sizes could be estimated. In nine of these thirteen studies (including all five of the randomized studies) results favored the heterogeneous groups, but the effects were mostly very small. The results were similarly negligible when analyzed at each ability level. The median effect size was .01 for high achievers, -.08 for average achievers, and -.02 for low achievers. As well, only one of seven studies from which effect sizes could not be computed found significantly positive effects of ability grouping for high achievers, and none of these studies found significant effects in either direction for average or low achievers.

Kulik and Kulik (1992) conducted a meta-analysis to examine the effects of different grouping practices on student achievement. A total of 56 studies examined effects of placement in multi-level classes on students. A total of 51 of the 56 studies measured effects on achievement tests. Approximately 60% of the studies found achievement was higher in the tracked classes. However, the differences were small and were not statistically significant. Thirty-six of the studies examined the results separately by students' ability levels and found that students in higher ability classes had clearer

academic benefits, but the students in average and lower ability classrooms were not affected, but also not academically harmed by multi-level classroom groupings.

Figlio and Page (2002) used NELS 8th grade achievement data to create their own groups of students, rather than using the school identified grouping system. Their sample (N = 7,676) included all students that have 10th grade school identifiers who also have 8th and 10th grade test scores available, information on tracking, and information on the following covariates: indicators for race, family income, indicators for parental education, census regions and urbanicity. The dependent variable was change in math score from grade 8 to 10. Their findings show no statistical significance between change in 8th to 10th grade mean math score between schools that track and schools that do not track (p = .364). The estimated coefficient on tracking is negative but trivial in magnitude for high-, middle-, and low-ability students (−0.19, −0.06, and −0.40) and these results suggest that the lower test score gains observed among students in low ability tracks stem not from their track placement, but rather from unobserved factors correlated with track placement (Figlio and Page, 2002).

Conclusion

The debate on which students should be granted access to accelerated mathematics courses is layered with complexities. Empirical studies provide mixed evidence as to whether tracking students leads to higher student achievement, making it difficult to reach a consensus about its benefits or consequences. Having all students enroll in Algebra I in 8th grade is one form of "reduced" tracking. This study will add to existing research by analyzing how a universal acceleration model (all students taking Integrated Algebra in 8th grade versus only a select few) impacts the cohort's timing on

when they took the Integrated Algebra Regents exam and their achievement on the exam. Test taking patterns and student achievement will also be disaggregated and analyzed at a demographic level, to determine how universal acceleration impacts subgroups of students differentially.

CHAPTER 3: METHODS AND PROCEDURES

This quantitative, quasi-experimental study explored the impact of universal acceleration on the timing of when a student took the Integrated Algebra Regents, along with student mathematics achievement on that exam. An interrupted time-series design was used to compare the district's participation rates of students taking the Regents exam in 8th grade and their performance on the Integrated Algebra Regents Exam before and after changing the Integrated Algebra enrollment policy.

Research Questions and Null Hypotheses

1. To what extent did the implementation of a universal acceleration policy affect the timing of students' Integrated Algebra Regents test taking?

   H_0: There are no significant differences in the timing of students' Integrated Algebra test taking between pre-universal acceleration and post-universal acceleration in this school district.

2. Did the implementation of a universal acceleration policy disproportionately affect the timing of students' Integrated Algebra Regents test taking of any racial subgroup?

   H_0: There are no significant differences in in the timing of students' Integrated Algebra test taking among racial subgroups between pre-universal acceleration and post-universal acceleration in this school district.

3. To what extent are there differences in Integrated Algebra Regents exam scores between pre-universal acceleration and post-universal acceleration in this school district?

   H_0: There are no significant differences in Integrated Algebra Regents exam scores between pre-universal acceleration and post-universal acceleration in this school district.

4. To what extent do the differences in Integrated Algebra Regents exam scores between pre-universal acceleration and post-universal acceleration differ by racial subgroup?

   H_0: There are no significant differences in Integrated Algebra Regents exam scores among racial subgroups between pre-universal acceleration and post-universal acceleration in this school district.

Data

This study used secondary data from students in the 8th grade cohorts beginning with the 2008-2009 eighth grade cohort and ending with the 2013-2014 eighth grade cohort from the Great Oaks School District (pseudonym). Universal acceleration first began in this district with the cohort of 8th graders in 2011-2012, therefore this sample included three cohorts prior to universal acceleration and three cohorts post universal acceleration. All students were included in the sample, including special education students, to ensure that there are a range of varying demographics, except for three students with unknown race and thirteen students who took the exam as 10th, 11th, or 12th graders. Students who re-took the exam a second time had only their first score included

in the data and all subsequent scores were removed. Table 1 shows the demographic breakdown of the students included in this data set, by race.

Table 1

Race of Students in Sample

	Frequency	Percent
White	1183	73.4
Black	90	5.6
Hispanic	267	16.6
Asian	44	2.7
Multi-Race	28	1.7
Total	1612	100

According to the New York State Report Card, in 2017-2018 the district in the study served 2,812 students across grades K-12. 61% of the population was white, 26% was Hispanic, 5% was black, 5% was Asian, and 3% was multi-racial. 32% of the population were considered economically disadvantaged. 14% of the students were classified as students with disabilities. 6% of the students were English Language Learners (NYSED Data Site, n.d.). It is interesting to note the changing demographics between the sample used in the study and the more current demographics in this district. The sample (2008-2014) contained higher percentages of white students and lower percentages of Hispanic students.

Research Ethics. The researcher gained initial permission from the Superintendent of Great Oaks School District (Appendix B) to access student data. To

ensure that no personally identifiable information was at risk, the researcher did not request any student identifying information. As well, the excel file and SPSS file containing the student level data was password protected. To further ensure the privacy of all students and school personnel in the study, the school district has been provided a pseudonym.

Policy Intervention

The treatment/intervention in this study was universal acceleration. An interrupted-time series was used to discern the differences, if any, on the timing of when a student takes the Integrated Algebra Regents exam and student achievement on the Integrated Algebra Regents before and after implementation of the universal acceleration policy. These outcomes were analyzed for all students and by racial subgroup. In the three years prior to universal acceleration, only 28% (08-09 cohort), 30% (09-10 cohort), and 32% (10-11 cohort) of the eighth graders in the district took Integrated Algebra. In the three years post-universal acceleration, percentages of eighth graders taking Integrated Algebra jumped to 96% (2011 cohort), 99% (2012 cohort), and 100% (2013 cohort) (NYSED Data Site, n.d.).

Instruments

While all data in this study is secondary, an important component is students' scores on the Integrated Algebra Regents exam (2009-2014). A passing score (65) on this exam is a requirement for students to graduate high school with a New York State Regents Diploma. According to the New York State Department of Education (NYSED) Technical Report, "Integrated Algebra is based on the content contained in the Mathematics Core Curriculum (Revised 2005). The first administration took place in

June 2008 and the new standards were set. The same standards have been maintained through the use of equating for the subsequent administrations: August 2008, January 2009, and June 2009." (New York State Regents Examination in Integrated Algebra Technical Report, 2009, p. 29)

The reliability for the 2009 Integrated Algebra Regents is .93 (New York State Regents Examination in Integrated Algebra Technical Report, 2009, p. 8). It is reasonable to assume that the reliability on this exam is consistent from year to year. The validity of score interpretations for the Regents Examination in Integrated Algebra is supported by multiple sources of evidence. The NYSED Department releases the test blueprint, outlining to districts the percentage of the test (by credits) that each instructional domain contains. As well, important element in ensuring test validity is that all test items are developed by New York State educators in a process facilitated by state subject matter and testing experts. State educators also conduct all item quality and bias reviews to ensure that item content is appropriate to the construct being measured and fair for all students. Finally, educators use the defined standards, test blueprint targets, and statistical information generated during field testing to select the highest quality items for use in the operational test.

Research Design and Data Analysis

To answer Research Questions 1 and 2, the following interrupted time series model was estimated:

$$Tookin8th_i = \beta_0 + \beta_1(t - t^*) + \beta_2(P_t) + \beta_3[(t - t^*)\, P_t] + e_t$$

In this model, $Tookin8th_i$ is the outcome of whether or not the student took the Integrated Algebra exam in 8th grade; t is the year (e.g., 2010, 2011); t^* is the year in which the

policy was adopted; and, P_t is an indicator that the observation is from the post-period (after policy implementation). Therefore, $\beta_1$is the trend in likelihood of a student taking the exam in 8th grade prior to the implementation of the policy; β_2 is the "jump" in percentage of students taking the exam in 8th grade that occurred at the time of implementation of the policy change; and, β_3 is the "shift" in the trend in percentage of students taking the exam in 8th grade after implementation. Coefficients will be considered significant at the $p < 0.05$ level. To understand whether the impact differs by racial subgroup (RQ2), the model was estimated separately for each racial subgroup and the coefficients from the model were compared.

To answer RQ3, the following interrupted time series model was estimated:

$$regents_i = \beta_0 + \beta_1(t - t^*) + \beta_2(P_t) + \beta_3[(t - t^*)\, P_t] + e_t$$

In this model, $regents_i$ is the Regents score of student i; t is year (e.g., 2010, 2011); t^* is the year in which the policy was adopted; and, P_t is an indicator that the observation is from the post-period (after policy implementation). Therefore, $\beta_1$is the trend in Regents scores prior to the implementation of the policy; β_2 is the "jump" in scores that occurred at the time of implementation of the policy change; and, β_3 is the "shift" in the trend in Regents scores after implementation. Coefficients will be considered significant at the $p < 0.05$ level. To understand whether the impact differs by subgroup (RQ3), the model was estimated separately for each racial subgroup and the coefficients from the model were compared.

Threats to Validity. The Interrupted Time Series model hinges on the fact that there are no other significant changes occurring simultaneously during the time period within the study, and specifically the time at policy change. New York State altered the

Algebra curriculum in 2013-2014, moving to the Common Core Learning Standards. This was the first year the exam changed to the Common Core Algebra I Regents compared to the previous Integrated Algebra Regents. During the 2013-2014 school year, students in New York State had to sit for the Common Core Algebra I Regents but had the option of also taking the Integrated Algebra Regents as well. During the 2013-2014 year, students in the 8th grade cohort in this district took both the Integrated Algebra Regents Exam and the Common Core Algebra I Regents Exam. For this study, only the results from the Integrated Algebra Regents Exam were used. This change in curriculum during the 2013-2014 school year may impact the validity of the data set from that school year.

CHAPTER 4: FINDINGS

This chapter contains the findings from the four research questions stated in previous chapters. SPSS software was used for the mathematical calculations to be addressed within this chapter. The critical coefficients for analysis include the trend in test taking in 8th grade and the Integrated Algebra scores within the district prior to policy implementation (β_1), the immediate change in test taking in 8th grade and the Integrated Algebra scores upon policy implementation (β_2), and the shift in the trend in test taking in 8th Grade and the Integrated Algebra scores within the district post-policy implementation (β_3). For analysis purposes, β_1 will be added to the coefficient β_3 to explain the trend in Integrated Algebra scores post-policy implementation.

Research Question 1

Table 2 shows the percentage of all students who took the Integrated Algebra Regents Exam in grade 8 versus grade 9 for the 2009 cohort through 2014. The district policy change of having all students take the Integrated Algebra Regents occurred first in 2011-2012.

Table 2

Percentage of All Students Taking Exam in 8th or 9th Grade

Grade 8 Cohort	Took Exam in 8th Grade	Took Exam in 9th Grade
2009	28.6	71.4
2010	30.8	69.2
2011	32.4	67.6
2012	100.0	0.0
2013	100.0	0.0
2014	100.0	0.0

Note: The sample included 1612 students. Numbers shown in table are percentages.

The interrupted time series model explained 51.1% of the variance in the timing of when students took the Integrated Algebra Regents Exam. This is not surprising since the policy change was directly related to altering the timing of when all students take the Integrated Algebra Regents Exam. The coefficient for trend prior to policy change (β =.019, p = .176) suggests that without the policy change there would be little change in who took the test in 8th grade. The coefficient for change at policy implementation (β =.656, p <.000) was statistically significant. This demonstrates that the policy change in 2011-2012 led to an average increase of 65.6% of students taking the Integrated Algebra Regents Exam in 8th grade. The coefficient for the shift in the trend post policy change (β =-.019, p = .356) also did not reach statistical significance, suggesting that the policy continues to function to have all students take the exam in 8th grade. The results are shown in Table 3.

Table 3

Coefficients of Multiple Regression Analysis on 8th Grade Test Taking

	8th Grade Test Taking
Intercept	0.344*
	(0.031)
TrendPrior	0.019
	(0.014)
Policy	0.656*
	(0.036)
TrendAfter	-0.019
	(0.021)

Note: *p < .05. Standard error in parentheses. The sample included 1612 students.

Research Question 2

Table 4 shows the breakdown of percentage of students taking Integrated Algebra in 8th grade based on race. Black and Hispanic students were less likely than white students to take the Integrated Algebra Regents Exam in 8th grade prior to the district's policy change. In the 2009-2011 8th grade cohorts, 32.9%, 31.5%, and 36.9% of white students took the exam in 8th grade, compared to 22.2%, 12.5%, and 15.4% for black students and 12.5%, 34%, and 17.5% for Hispanic students. The move to all students taking Algebra in 8th grade beginning with the 2012 yielded the biggest 'participation' change among black, Hispanic, and Asian students. This difference could explain

challenges that these subgroups of students might have under an acceleration for all model.

Table 4

Percentage of All Students Taking Exam in 8th or 9th Grade, by Race

	White		Black		Hispanic		Asian		Multi-Racial	
Grade 8 Cohort	8th	9th	8th	9th	8th	9th	8th	9th	8th	9th
2009	32.9	67.1	22.2	77.8	12.5	87.5	20	80	0	100
2010	31.5	68.5	12.5	87.5	34	66	60	40	0	100
2011	36.9	63	15.4	84.6	17.5	82.5	14.3	85.7	0	100
2012	100	0	100	0	100	0	100	0	100	0
2013	100	0	100	0	100	0	100	0	100	0
2014	100	0	100	0	100	0	100	0	100	0

Note: Numbers shown in table are percentages.

The model estimates further that the change to an acceleration for all model impacted minority students more than white students regarding the timing of when the student took the Integrated Algebra Regents Exam (Table 5). The coefficients for change at policy implementation for white (β =.623, p < .000) students indicate that the policy change led to a 62.3% increase in the number of white students taking the Integrated Algebra Regents in 8th grade. Comparatively, black (β =.909, p < .000) , Hispanic (β =.730, p < .000) and Asian (β =.732, p = .014) students had greater increases in percentages of students that took the exam in 8th grade after policy change. When the data was grouped into white and non-white, the findings remained consistent. Non-white students (β =.779, p < .000) saw an average increase of 77.9% of students taking the

exam in 8th grade upon policy change, which is greater than the 62.3% change noticed for white students. The findings are shown in Table 5.

Table 5

Coefficients of Linear Regression on 8th Grade Test Taking, by Race

	Unstandardized B					
	White	Black	Hispanic	Asian	Multi-Race	Non-White
Intercept	0.377*	0.091	0.270*	0.268	0.000	0.221*
	(.037)	(0.113)	(.069)	(.199)	(.000)	(.054)
Trend Prior to Policy	0.02	-.038	0.025	0.004	0.000	0.008
	(.017)	(.050)	(.032)	(.081)	(.000)	(.024)
Change in Policy	0.623*	0.909*	0.730*	0.732*	1.000	0.779*
	(.043)	(.131)	(.079)	(.285)	(.000)	(.063)
Change in Trend After Policy	-0.02	.038	-.025	-.004	.000	-.008
	(.025)	(.075)	(.044)	(.149)	(.000)	(.034)
Number of Students	1183	90	267	44	28	429

Note: *p < .05. Standard error in parentheses. The sample included 1612 total students. Non-white includes all races in the table except for white.

Research Question 3

Table 6 shows the coefficients for the interrupted time series, predicting Integrated Algebra Regents scores for all students. The coefficient for the trend in Integrated Algebra scores within the district prior to policy implementation was .732 (p =

.093), which did not reach statistical significance. The coefficient of -.228 (p = .839) for the immediate change in scores upon policy implementation also did not meet statistical significance. The shift in the trend in Integrated Algebra scores is -1.814, indicating a decrease of 1.082 points (trend prior plus trend after), on average each year for all students after implementation. This was the only variable that reached statistical significance (p = .005). The adjusted R^2 value was .003, indicating that only .3% of the variance in test scores on the Integrated Algebra Regents was explained by the predictors.

Table 6

Coefficients of Multiple Regression Analysis on Student Achievement

	Unstandardized B
Intercept	79.536*
	(.950)
Trend Prior to Policy	.732
	(.435)
Change in Policy	-.228
	(1.120)
Change in Trend After Policy	-1.814*
	(.638)

Note: *p < .05. Standard error in parentheses. The sample included 1612 students.

When controlling for gender and race (Table 7), the adjusted R^2 value of .065 indicates that 6.5% of the variance in Integrated Algebra scores can be explained by the predictors. On average, black students and Hispanic students scored lower than white students, Asian students scored higher than white students, and females scored higher

than males. However, the coefficients on trend prior, change in policy, and shift in trend after do not change substantially.

Table 7

Interrupted Time Series Analysis for Student Achievement, Controlling for Race and Gender

	Integrated Algebra Regents Scores
Intercept	78.926*
	(.961)
Trend Prior to Policy	0.805
	(.422)
Change in Policy	-0.122
	(1.085)
Change in Trend After Policy	-1.854*
	(.620)
Black Indicator	-6.121*
	(1.109)
Hispanic Indicator	-4.187*
	(.689)
Asian Indicator	3.772*
	(1.561)
Multi-Race Indicator	2.309
	(1.944)
Female Indicator	3.075*
	(.505)

Note: *p < .05. Standard error in parentheses. The sample included 1612 students.

Research Question 4

To answer this research question, the data file was split to analyze the findings for each racial subgroup. For white students, none of the coefficients on prior trend (β =.276, p = .551), policy jump (β =1.328, p = .265) or post-policy change in trend (β =-1.228, p = .076) were significant. This indicates that the policy change did not significantly affect white students. Similarly, for black students, none of the coefficients on prior trend (β =1.045, p = .640), policy jump (β =-4.860, p = .407), or post-policy change in trend (β =.015, p = .996) were statistically significant. It is important to note that black students had by far the greatest change among any race in the percentage of test takers in 8th grade upon policy implementation, yet their scores did not change in a statistically significant way. For Asian students, prior trend (β =.436, p = .826), policy jump (β = -7.802, p = .266) and post-policy change in trend (β =2.207, p = .546) failed to reach statistical significance either. Multi-race students demonstrated statistical significance for prior trend (β =8.125, p = .025) only, suggesting their scores had been increasing prior to policy implementation. For Hispanic students, prior trend (β =3.138, p = .020) and post-policy change in trend (β =-5.644, p = .002) reached statistical significance, while policy jump (β =-5.475, p = .098) did not. Over time prior to implementation, scores for Hispanic students in this district were increasing by 3.138 points on average. After implementation, scores for Hispanic students dropped on average 2.506 points per year (trend after plus trend prior).

When the data was sorted into two groups, white and non-white, the non-white group showed statistical significance for trend prior to policy (β =2.048, p = .045).

Policy jump (β =-4.695, p = .075) and shift in trend after policy (β =-2.791, p = .052) failed to reach statistical significance. The results are shown in Table 8.

Table 8

Coefficients of Linear Regression on Student Achievement, by Race

	White	Black	Hispanic	Asian	Multi-Race	Non-White
Intercept	79.188*	75.966*	82.007*	84.445*	92.500*	80.472*
	(1.005)	(5.02)	(2.875)	(4.832)	(7.825)	(2.267)
Trend Prior to Policy	0.276	1.045	3.138*	0.436	8.125*	2.048*
	(0.463)	(2.226)	(1.336)	(1.973)	(3.388)	(1.02)
Change in Policy	1.328	-4.86	-5.475	-7.802	-8.149	-4.695
	(1.191)	(5.83)	(3.302)	(6.921)	(8.361)	(2.63)
Change in Trend After Policy	-1.228	0.015	-5.644*	2.207	-8.154	2.791
	(0.691)	(3.324)	(1.814)	(3.629)	(3.992)	(1.429)
Number of Students	1183	90	267	44	28	429

Note: *p < .05. Standard error in parentheses. Non-white includes all races in the table except for white.

CHAPTER 5: DISCUSSION

The findings from this research indicate that prior to universal acceleration, fewer percentages of minority students took the Integrated Algebra Regents in 8th grade compared to white students. The policy was implemented very effectively and 100% of students took the exam in 8th grade following policy implementation. There was not a significant change in Integrated Algebra scores pre-policy and at policy change overall, and most sub-groups of students did not see a significant difference in exam scores pre/post policy. Post-policy, scores on the exam were decreasing, however it was a very small decrease and was driven by one racial subgroup, Hispanic students.

Implications of Findings

Prior to implementing a universal acceleration policy, white students were more likely to take Integrated Algebra in 8th grade compared to minority students. This relates back to the Marxist View on Education, which viewed the educational system and curriculum as unfair and yielding social inequalities. (Samkange, n.d.) In tracked educational settings, Braddock (1990) and Oakes (1990) found that minority students and students of low socioeconomic status are over-represented in the lower tracks. This district's policy shift of moving to an 'acceleration for all' model helped reduce access and opportunity issues that were present prior to implementation. This is supported by Burris and Welner (2005), who found in their study of one Long Island, NY district that Hispanic (58%) and black (38%) students were over-represented in the lower-tracked classes. Also, Patrick, Socol, and Morgan (2020) found that in the United States, black and Latino students were underrepresented in advanced courses.

Since a significant difference in scores overall was not noticed pre-policy and at policy change, the Marxist View on Education would support the notion that acceleration for all students increases access and equity, while also not harming student achievement. Prior to policy implementation, students' scores were not increasing at a statistically significant level, and the year of policy implementation, there were not significant differences in achievement. When the data was analyzed separately by race, only Hispanic students and multi-race students showed a significant change in scores in any of the variables tested. It is worth noting that black students experienced the greatest change of any racial group in the percentage of students taking the exam in 8th grade after implementation, yet black students showed no statistically significant change in achievement. This is remarkable considering the policy change led to an average increase of 90.1% black students taking the exam in 8th grade, and while their scores at implementation decreased, it was not statistically significant between pre/post implementation. It must be noted, however, the small sample size of black students in this study ($N = 90$). More data would be needed to fully understand the extent to which these students benefitted from taking a challenging course a year earlier.

These findings align with similar research, including Nomi (2012), who found that an Algebra for All policy did not have statistically significant effects on math scores in the first year of policy implementation. Similarly, Slavin's (1990) meta-analysis found that grouping differences had little to no effect on student achievement. Figlio and Page (2002) argue that lower test score gains observed among students in low ability tracks stem does not from the track placement itself but from other unobserved factors.

It also must be noted that it is not surprising that a policy change to an accelerated mathematics curriculum for all students would initially yield lower test scores on average. All students are taking the exam a year earlier than they might have otherwise done, which makes it reasonable to expect slightly lower scores as they are missing out on an additional year of algebra preparation. It is also reasonable that it would take more than three years post policy to notice the positive effects of an acceleration for all model, as students, staff, and the community at large adjust to this new policy change. Curriculum in years prior would need time to be modified to help students have success in Algebra in 8th grade, which might take years to fine tune. One of the benefits of an acceleration for all model is increasing the opportunity and access for students to experience a challenging and rigorous curriculum with their entire cohort, which this district accomplished. Moreover, the decline in scores post policy is small.

It is worth exploring the decline in scores post-policy for Hispanic students, as Hispanic student scores prior to implementation were increasing significantly. Hispanic students might also have other factors impeding their academic growth (language barriers, cultural differences, socio-economic factors), and thus scheduling them all into Algebra in 8th grade might constrict academic progress. These findings are supported by Robinson (2008), in his study of ability grouping on Kindergarten and 1st grade reading on Hispanic Language Minority Students (LM/P). He found that Hispanic children in ability grouped settings gain .14 points per month more than ability-grouped white children, and .62 points per month more than non-ability-grouped Hispanic children. This relates to Vygotsky's Zone of Proximal Development (ZPD), which argues that there is a specific 'zone' that students should be pushed into in learning, where they are right

outside the region where they know information and, with the right supports, can push into the next level of learning and understanding. Shabani, Khatib, & Ebadi (2010) explain that the ZPD is the gap between a student's "actual development level…and the level of potential development." A universally accelerated model could create conditions where it could be challenging for the teacher to appropriately challenge and engage such a vast range of learners, thus denying them access to their ZPD's. These findings are challenged by Burris and Welner (2005), who found that after universally acceleration student in mathematics, achievement and outcomes for black and Hispanic students improved significantly.

Limitations of the Study

When conducting an interrupted time series analysis, one of the limitations is the likelihood that other factors that occur simultaneously with the policy change could have led to some of the noticed impacts (e.g. new technology use in classrooms, a new principal being hired, etc.) These unknown factors could contribute to changes in achievement that are not related to the policy change. Also, while all students in the cohort were included in the data set, this study did not factor in prior achievement, socioeconomic status, or special education status as variables within the analysis. Had the study been able to account for prior achievement, the researcher would have been able to determine the impact of a universal acceleration policy on low, middle, and high achieving students. In addition, being able to control for socioeconomic status and special education status could have helped yield more statistically powerful results. While the researcher controlled for race and gender, other factors like prior achievement, socioeconomic status, and special education status often have strong correlations to future

performance. As well, the researcher only used one suburban district in New York state, thus the findings are limited to other suburban districts in New York state. The sample for this data set was predominantly white ($N = 1183$) and Hispanic ($N = 267$), and the small sample size of black ($N = 90$) Asian ($N = 44$) and multi-race ($N = 28$) students limited the statistical power of the analyses.

Recommendations for Future Practice

School leaders should be reviewing their current district's achievement data to discover if there are achievement and participation gaps in their advanced coursework. Many schools look at achievement data alone, which is an incomplete picture of how a school is performing. Participation rate in advanced coursework across race, socioeconomic status, and gender must also be analyzed. If there are inequities there, universal acceleration is one way to ensure that there are no biases in terms of giving students access to advanced coursework. Findings from this study show that prior to universal acceleration, minority students had less participation in accelerated Algebra than their white peers. When the district moved to universal acceleration in 2012, that participation rate became equal. Black and white student scores did not change significantly with policy implementation. Hispanic student scores did decline each year after policy implementation, albeit by a small factor.

A move to a universally accelerated mathematics program is a significant change for both students and staff. It is reasonable to expect in the year of implementation and in the years that follow for there to be a slight decrease in scores, since all students are taking the exam a full year earlier than most students traditionally would and are missing out on a year of algebra preparation. Thus, it is imperative for school leaders to plan and

be proactive in setting up supports for historically marginalized groups. Prior achievement should also be looked at to identify those students who might struggle with an accelerated curriculum (regardless of race), so that interventions can occur quickly and immediately. The district should also review the mathematics curriculum in prior grades in order to best support future 8th graders in being successful and ready for an Algebra course in 8th grade.

A shift to an acceleration for all model requires tremendous buy-in and effort from staff. It is likely that some teachers will have the mindset that not all students should be taking Algebra in 8th grade. It is the role of the school leader to help and support these teachers. Providing them the most up to date and current research on the topic, sharing specific and concrete data outlining the district's current achievement/participation rates, and providing meaningful and purposeful professional development on differentiation and effective teaching strategies is critical to ensuring the success and sustainability of a universally accelerated mathematics program.

As with any new program, reviewing the progress of the implementation is critical to ensuring there is viability and if adjustments are needed along the way. School leaders and teachers should continually monitor student achievement data to identify struggling students, so that interventions can be put into place. The school leader should also regularly seek feedback from teachers, students, and families, so that he/she can have a holistic view of the progress of the implementation.

Recommendations for Future Research

Future research could encompass a "comparative" interrupted time series between two similar school districts, one that adopted a universal acceleration policy and one that

did not. A benefit to doing this comparison would be the ability to control for other external factors that are occurring simultaneously. It might also be beneficial to conduct research on how prior achievement and socioeconomic status impacts student achievement after a universal acceleration policy is adopted. This can reveal how a universal acceleration program impacts high, middle, and low achieving students and students of varying economic backgrounds differentially. This is important because one of the concerns with a universal acceleration policy change centers around the impact it has on high achieving students. The school community will want to know that universally accelerating all students does not have a detrimental effect on advanced learners. Future research should also include the impact of a universal acceleration policy on special education students. Much like was seen with minority students, special education students would likely be one subgroup that would also have a large change in percentage of students taking the exam in 8th grade upon policy change. As well, future research could be extended to observe how the universal acceleration policy in this district impacted the participation rates in higher level math courses down the road for students (Algebra II, Calculus, etc.) and the type of diploma they earn. Future research might also explore not only the impact a universal acceleration policy has on achievement, but also how it impacts Mastery level (score of 85 and above). It also might be beneficial to conduct research on teacher and student perspectives of a universal acceleration policy. School leaders could benefit from learning how staff and students perceive such a policy change, so that they can be aware of potential drawbacks and pitfalls that might arise.

Conclusion

Overall, the findings from this research show that moving to an acceleration for all policy helped improve the equity and access to taking Algebra in 8th grade across racial groups. This is notable because in this district, minority students represented a smaller percentage of the students in 8th grade Algebra compared to white students prior to the policy change. White, black, and Asian students did not notice significant changes in scores pre-policy, at policy change, and in the shift in trend in scores after implementation. Hispanic students were the only racial subgroup that noticed statistically significant decreases in the shift in the trend of scores on the Integrated Algebra Regents exam post policy change. A universal acceleration policy is a way for a district to ensure that all students, regardless of prior achievement, race, socioeconomic status, etc. have access to high level coursework with their peers. However, school leaders must be proactive and anticipate which students are likely to struggle with this change and ensure that supports are in place to help those learners. Coordination with staff and aligning curriculum at the lower levels to help accommodate this change is essential to ensuring that the move to an Algebra for all program in 8th grade is successful, sustainable, and helps prepare students for high school level mathematics.

Appendix A

IRB Approval

IRB-FY2020-349 - Initial: Initial - Exempt - St. John's

irbstjohns@stjohns.edu <irbstjohns@stjohns.edu>
Wed 1/8/2020 3:54 PM
To: fahlee@stjohns.edu <fahlee@stjohns.edu>; Patrick Walsh <patrick.walsh17@my.stjohns.edu>

ST. JOHN'S UNIVERSITY

Federal Wide Assurance: FWA00009066

Jan 8, 2020 3:54 PM EST

PI: Patrick Walsh
CO-PI: Erin Fahle
Dept: Ed Admin & Instruc Leadership

Re: Initial - IRB-FY2020-349 THE IMPACT OF UNIVERSALLY ACCELERATING EIGHTH GRADE MATHEMATICS STUDENTS IN HETEROGENEOUSLY GROUPED CLASSROOMS: AN INTERRUPTED TIME SERIES

Dear Patrick Walsh:

The St John's University Institutional Review Board has rendered the decision below for THE IMPACT OF UNIVERSALLY ACCELERATING EIGHTH GRADE MATHEMATICS STUDENTS IN HETEROGENEOUSLY GROUPED CLASSROOMS: AN INTERRUPTED TIME SERIES.

Decision: Exempt

PLEASE NOTE: If you have collected any data prior to this approval date, the data needs to be discarded.

Selected Category: Category 3.(i)(A). Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection.
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Sincerely,

Raymond DiGiuseppe, PhD, ABPP
Chair, Institutional Review Board
Professor of Psychology

Marie Nitopi, Ed.D.
IRB Coordinator

Appendix B

District Consent

From: Patrick Walsh <patrick.walsh17@my.stjohns.edu>
Sent: Tuesday, October 29, 2019 5:50 PM
To: [redacted]
Cc: Erin Fahle <fahlee@stjohns.edu>
Subject: Dissertation Request

Dear [redacted]

My name is Patrick Walsh and I am a doctoral candidate in the Department of Administration and Supervision at St. John's University, and I am currently an Assistant Principal at South Side High School in Rockville Centre. I am working on my dissertation, which is on Universally Accelerating students in 8th grade mathematics and its impact on student outcomes. I am reaching out since it is my understanding that all 8th grade students in the [redacted] sit for the Algebra I Regents Exam in 8th grade, starting in the 2011-2012 school year. I would be interested in using secondary data from your district in my study, to explore student outcomes prior to universal acceleration and post universal acceleration. I will gladly share with you the findings of my study, and also share with you the literature review that focuses on universal acceleration and tracking.

The student level data I would need permission to access from your district would include state test scores from grades 6-12 (all that are available), demographic information about the student (race/ethnicity, FRPL status) and diploma type earned (Regents, Regents with Advanced Designation). I would request data for the 8th grade cohorts beginning in 2008-2009 through 2014-2015 in order to analyze a before/after scenario. **No student identifiers of any kind would be included in the data requested. I also would not use the name of your district anywhere in the study or provide any information that would make it identifiable.**

If you have further questions, please do not hesitate to reach out to me via e-mail or the phone number below. Also, if you would prefer to meet in person, please let me know a time that is convenient for you. I've also cc'd and included the name and contact information of my mentor at St. John's if you have any questions directly for her.

Thank you,

Patrick Walsh

RE: Dissertation Request

[redacted]

Wed 10/30/2019 10:36 AM

To: Patrick Walsh <patrick.walsh17@my.stjohns.edu>

* External Email *

I am most interested in your study. Please know that Rockville Centre was my inspiration for this initiative. Our results have been impressive, if I do say so. This year at our middle school we had over a 90% pass rate. We have been working on increasing our mastery level. I can provide you with the data you need. Our CIO is [redacted] and she can give this to you without names, as a spread sheet. Please list each column and be very specific.

Much luck with your studies.

[redacted]

Superintendent

[redacted]

[redacted]

REFERENCES

Allensworth, E., Nomi, T., Montgomery, N., & Lee, V. E. (2009). College Preparatory Curriculum for All: Academic Consequences of Requiring Algebra and English I for Ninth Graders in Chicago. *Educational Evaluation and Policy Analysis*, *31*(4), 367–391. doi: 10.3102/0162373709343471

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). Standards for educational and psychological testing. Washington, DC: American Educational Research Association.

Assessment Glossary: NYSED Data Site. (n.d.). Retrieved April 29, 2020, from https://data.nysed.gov/glossary.php?report=assessment.

Atterbery, A., Lacour, S.E., Burris, C., Welner, K., Murphy, J. (2019). Opening the gates: detracking and the International Baccalaureate. *Teachers College Record*. 121, 1-63.

Braddock, J. H. (1990). Tracking: Implications for student race-ethnic subgroups (Tech. Rep. No. 1). Baltimore, MD: Center for Research on Effective Schooling for Disadvantaged Students.

Buttara, C. & Catsambis, S. (2019). Ability grouping in the early grades: long term consequences for educational equity in the United States. *Teachers College Record*. 121(2), 1-50.

Burris, C.C. & Welner, K.G. (2005) Closing the achievement gap by detracking. *Phi Delta Kappan*, 86(8), 594-598.

Collins, C., & Gan, L. (2013). Does Sorting Students Improve Scores? An Analysis of

Class Composition. doi: 10.3386/w18848.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297– 334.

Domina, T., Penner, A. M., Penner, E. K., & Conley, A. (2014). Algebra for all: California's eighth-grade algebra initiative as constrained curricula. *Teachers College record (1970)*, *116*(8), 1–32.

Dougherty, S., Goodman, J., Hill, D., Litke, E., & Page, L. (2015). Objective Course Placement and College Readiness: Evidence from Targeted Middle School Math Acceleration. doi: 10.3386/w21395.

Every Student Succeeds Act (ESSA). (n.d.). Retrieved from https://www.ed.gov/essa.

Figlio, D., & Page, M. (2000). School Choice and the Distributional Effects of Ability Tracking: Does Separation Increase Equality? *Journal of Urban Economics, 5151*, 497-514. doi:10.3386/w8055.

Hallinan, M. T., Bottoms, E., Pallas, A.M., Palla, A.M. (2003). Ability Grouping and Student Learning. *Brookings Papers on Education Policy*, *2003*(1), 95–124. doi: 10.1353/pep.2003.0005

Kulik, J., & Kulik, C. L. (1992). Meta-analytic findings on grouping programs. Gifted Child Quarterly, 36, 73-77. doi: 10.1177/001698629203600204

Leonard, J. (2001). How group composition influenced the achievement of sixth-grade mathematics students. Mathematical Thinking and Learning, 3, 175-200. doi:10.1080/ 10986065.2001.9679972

Loveless, T. (1998). The tracking and ability grouping debate. Washington, DC: Fordham Institute.

National Center for Education Statistics (NCES) Trends in International Mathematics and Science Study. (n.d.). Retrieved from https://nces.ed.gov/.

New York State Archives. (2009) *Federal education policy and the states, 1945-2009: A brief synopsis* (Rep.). New York State Diploma Requirements Applicable to All Students Enrolled in Grades 9-12 (2019). Retrieved from http://www.nysed.gov/common/nysed/files/programs/curriculum-instruction/diplomarequirementsfinal011019.pdf.

New York State Regents Examination in Integrated Algebra 2009 Technical Report (pp. 1-58, Rep.). (2016). Pearson.

Nomi, T. (2012). The Unintended Consequences of an Algebra-for-All Policy on High-Skill Students: Effects on Instructional Organization and Students' Academic Outcomes. *Educational Evaluation and Policy Analysis, 34*(4), 489-505. Retrieved from http://www.jstor.org/stable/23357024

NYSED Data Site. (n.d.). Retrieved from https://data.nysed.gov/.-

Oakes, J, (1985). Keeping track: How schools structure inequality. New Haven, CT: Yale University Press.

Oakes, J. (1990). Multiplying inequalities: The effects of race, social class, and ability grouping on opportunities to learn mathematics and science. Santa Monica: RAND.

Oakes, J., & Guiton, G. (1995). Matchmaking: The dynamics of high school tracking decisions. *American Educational Research Journal, 32*(1), 3.

Patrick, K., Socol, A., & Morgan, I. (2020). Inequities in advanced coursework: What's driving them and what leaders can do. *The Education Trust*.

Pijanowski, S. (2015). Reconciling educational adequacy and equity arguments through a Rawlsian lens. *eJournal of Education Policy*. Retrieved October 15, 2018, from https://files.eric.ed.gov/fulltext/EJ1158105.pdf.

Research Spotlight on Academic Ability Grouping. (n.d.). Retrieved from http://www.nea.org/tools/16899.htm.

Robinson, J. P. (2008). Evidence of a Differential Effect of Ability Grouping on the Reading Achievement Growth of Language-Minority Hispanics. *Educational Evaluation and Policy Analysis*, *30*(2), 141–180. doi: 10.3102/0162373708317742.

Samkange, W. (n.d.) Examining the role and purpose of education within the Marxist perspective. *Global Journal of Advanced Research, 2*(11), 1765-1769. doi:http://gjar.org/publishpaper/vol2issue11/d339r76.pdf.

Shabani, K., Khatib, M., & Ebadi, S. (2010). Vygotskys Zone of Proximal Development: Instructional Implications and Teachers Professional Development. *English Language Teaching*, *3*(4). doi: 10.5539/elt.v3n4p237

Slavin, Robert E. Achievement Effects of Ability Grouping in Secondary Schools: A BestEvidence Synthesis. Vol. 60, No. 3. *Review of Educational Research*, Fall 1990. 471-499.

The Condition of Education 2019 (Rep.). (2019). National Center for Education Statistics. Thinking Algebraically: Promoting rigorous mathematics for all students (Policy Brief 22). Retrieved from http://www.nea.org/assets/docs/HE/PB22_Algebra.pdf.

Wheelock, A. (1994). Alternatives to tracking and ability grouping. *American*

Association of School Administrators, 1-85.

Vita

Name	*Patrick T. Walsh*
Baccalaureate Degree	*Bachelor of Arts, Molloy College, Rockville Centre, NY* *Major: Secondary Mathematics Education (7-12)*
Date Graduated	*May, 2009*
Other Degrees and Certificates	*Master of Science, Molloy College, Rockville Centre, NY* *Major: Secondary Mathematics Education (7-12)*
Date Graduated	*May, 2012*
Other Degrees and Certificates	*Certificate of Advanced Study in Educational Leadership & Administration, The College of St. Rose, Albany, NY*
Date Graduated	*December, 2016*