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Ability Grouping Interventions and Math Performance Among Inner-City School

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Vladimir Sreckovic

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Walden University
2015

Abstract

Ability Grouping Interventions and Math Performance Among Inner-City School Students

by

Vladimir Sreckovic

MA, Oakland University, 2014

MA, University of Chicago, 2008

BA, Stony Brook University, 2007

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Education

Walden University

August 2015

Abstract

In the city selected for this study, only 29% of inner-city students scored proficiently on standardized tests, whereas 71% of their peers at nearby suburban and affluent schools achieved the proficiency level. To address the gap, the local district implemented ability grouping in one charter school. The purpose of this ex post facto quasi-experimental study was to examine the effect of ability grouping among inner-city students in mathematics as an instructional intervention for improving student achievement. Ability grouping theory as an instructional strategy was used as the theoretical framework for this study. The criterion measure of mathematics improvement was provided by the test results from the Northwest Evaluation Association's Measure of Academic Progress (NWEA-MAP), a computer-adaptive assessment of mathematics. Using population data for 2012–2014 inner-city 8th graders who took the pretest and posttest NWEA-MAP ($N = 234$), two 1-way analyses of variances were used to test for mean differences in the NWEA-MAP improvement scores between ability-grouped ($n = 115$) and non-ability-grouped ($n = 115$) students, then specifically between students who were grouped as high ability ($n = 55$) and low ability ($n = 55$). The ability-grouped students had significantly higher improvement scores than did the nongrouped students. For those students who were ability grouped, no statistically significant difference existed in improvement between the high and low ability groups. A position paper was developed recommending student grouping to improve academic performance of inner-city school students. Positive social change will occur as the achievement gap is closed for students who attend inner-city schools.

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Dedication

This doctoral project study is dedicated to my parents. On my way to my big dreams, big things have indeed happened. Thank you for your support, your faith, and your love. We have just begun.

Acknowledgments

Dr. Strunk, every great journey needs a champion. Thank you for being mine. I am extremely proud to have begun and ended my doctoral journey with you. The rest of the journey we walk as friends.

Dr. Tappler, thank you for helping me navigate through the methodology of my research project. Thank you for keeping my project study scientifically sound through the tempest of my own passion.

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Table of Contents

List of Tables

List of Figures

Section 1: The Problem

Introduction

When the U.S. Department of Education originally developed the concept of Title I programs under the Elementary and Secondary Education Act of 1965, it envisioned a set of provisions that would create better educational opportunities for the students from the low socioeconomic status (SES) backgrounds (U.S. Department of Education). Four decades later, the No Child Left Behind (NCLB) Act of 2001 resurrected the concept of Title I as the necessary vehicle to elevate the quality of education in low SES environments by standardizing the academic expectations, detailing the demographic composition of the student population, and offering exceptional funding for the remedial and interventionist programs for the attending low SES students (Braun, Chapman, & Vezzu, 2010; Coalangelo, Assouline, & Gross, 2004; Gill, 2011; U.S. Department of Education, 2015). More than13 years after the NCLB Act and new Title I funding, inner-city schools that serve racial minorities and students from low SES backgrounds remain in the achievement gap behind nonminority students from suburban environments (Delpit, 2012; Durant & Michael, 2013; Gottfried, 2014; Li & Hasan, 2010; U.S. Department of Education). Moreover, when schools receive and use additional funds, they tend to focus their attention on helping the lowest-performing students while neglecting the potential of the talented and capable students who require enrichment and advanced curricula, instruction, and exposure to learning (Braun et al., 2010; Delpit, 2012; Gill, 2011). Placed in the overcrowded classrooms with limited resources and instructional staff, inner-city students of various learning needs and skill sets often fail to meet the standardized threshold that leads to advanced educational and career opportunities (Braun et al., 2010; Olszewski-Kubilius, Lee, Ngoi, & Ngoi, 2004; Veltri, 2008).

Knowledge is power (Hobbes, 1660). However the transmission of that power from the source, a teacher, to a target, a student, has historically been the scarcity and the exclusive right of the powerful. As such, the other phrase that blissfully appreciates ignorance as an alternative to the powerful education evolved into a massive pacifier for the uneducated plebs (Gray, 1742). Through the years, and after a long struggle and triumph for equality, desegregation, and readily available resources of education and knowledge, it remains unclear whether we are powerfully ignorant or blissfully cognizant of the exclusiveness of education in today's world (Braun et al., 2010; Delpit, 2012; Gill, 2011; Olszewski-Kubilius et al., 2004; Veltri, 2008).

The separation between the ignorant, or uneducated, and the powerful, or educated, grows even more poignant when the divide coincides with the ethnic and racial composition of the population (Dupere, Leventhal, Crosnoe, & Dio, 2010; Kafi, 2012; Rardon, Grewal, Kalogrides, & Greenberg, 2012; Simms, 2012). Racial and ethnic minorities tend to fall within the same inner-city perimeters that circumscribe the population of the lowest socio-economic status (Barela, 2008). As such, what once was a mandated racial segregation of the students became a spontaneous segregation of the wealthy (Barela, 2008; Lapayesse, Aldana, & Lara, 2014; Reardon et al., 2012). Coincidentally, the racial and ethnic minorities from the poverty strata attend the underfunded, understaffed schools of the inner-city (Barela, 2008; Finkel, 2010; Weiner, 2006). Without the quality education, competitive curricula, qualified teachers, and the necessary opportunities for self-betterment, the same racial and ethnic minorities from the low SES inner-city backgrounds enter inner-city classrooms and become the permanently underperforming, *underknowning* and *underearning* members of society (Attewell & Domina, 2008; Delpit, 2012; Dupere et al., 2010; Kafi, 2012; Lapayesse et al., 2014; Loveless, 2009; McAllister & Plourde, 2008).

Rationale

Evidence of the Problem at the Local Level

In a city where the population is 80% Black, or African American, and 10% White, and in which 40% of residents are living below the poverty line (U.S. Census), a distinct gap in academic achievement exists. The highest-ranked high school in this city, graduating between 200 and 300 students each year, ranks only 35th among the best high schools in the state and well outside the top 1,000 schools in the United States (Michigan Department of Education). In a predominantly White and affluent community located slightly more than 20 miles north, students can attend the ninth nationally ranked high school that achieves 100% college readiness (Michigan Department of Education, 2015). Despite scholarship partnerships with multiple universities, the majority of the inner-city students remain in the same predicament that the NCLB-Title I Act had envisioned to improve (University of Michigan, School of Education, 2015). The $150 million (Detroit Public Schools [DPS], 2014) in Title I funding to help disadvantaged students rarely translates into educational trajectories that permanently alter students' lives. Rather than improve the educational opportunities for the disadvantaged students, most of the Title I funds are perceived to serve the systemic, institutionalized, and unequal distribution of opportunities, knowledge, and wealth, while protecting the status quo (Barela, 2008; Delpit, 2012; Harwell & LeBeau, 2010; Kafi, 2012; Reardon, 2012; Simms, 2012). Given that the funds exist, it is important to explore how different educational solutions from the high-achieving environments can translate into immediate improvements in the inner-city schools.

Evidence of the Problem From the Professional Literature

In classrooms of 40 to 60 students who come from various backgrounds, it becomes increasingly difficult to deliver the academic content appropriate for the various learning capacities and needs of all students, especially when the skill level of the students can range from six to eight grade levels (Finkel, 2010; Kulik & Kulik, 1993; Lapayesse et al., 2014; WestEd, 2012). Heterogeneous learning cohorts in inner cities that lack effective teachers and the necessary intrinsic culture for learning, often position classroom management at the epicenter of instruction (Alliman-Brissett & Turner, 2009; Delpit, 2012; Emdin, 2011; Finkel, 2010; Veltri, 2008; Weiner, 2006). Although inner-city education comes implicitly with the concept of *reality pedagogy*, the term that Emdin (2011) used to represent the cultural understanding of inner-city students within a particular space, it is crucial to uphold academic achievement beyond the potential cultural mismatch between the content and the learner.

Few avenues for advancement and enrichment in inner cities translate into the competitive advantages enjoyed by many nonminority students in the affluent suburbs. Stuck in heterogeneous classrooms, most students who could benefit from an accelerated education never experience it (Alliman-Brissett & Turner, 2009; Gill, 2011). The same heterogeneous classrooms also hinder the learning outcomes of the struggling students who need an entire class period of instruction rather than a few minutes of differentiation with a teacher. It is in this mismatch between the instructional platforms and the learning needs of the students where the inner-city schools institutionalize, rather than ameliorate, the educational segregation between the minority and nonminority population (Barela, 2008; Braun et al., 2010; Finkel, 2010; Olszewski-Kubilius et al., 2004; Simms, 2012). Consequently, student grouping as an instructional intervention in inner-city environments could potentially maximize the instructional time that each of the student groups needs and expedite the level of academic achievement across the ability spectrum.

Definitions

To streamline the understanding of the content of this study, it is important to define the following terms:

Ability grouping of students: Also identified as multilevel classes, ability grouping of students represents the concept of assigning students of the same grade level on the basis of their ability within the content of various classes (Kulik & Kulik, 1993, p. 73).

Heterogeneous grouping: The default grouping of students that encompasses a vast array of ability levels within a single cohort (Slavin, 1987, p. 6)

Homogeneous grouping: The grouping of students that based on learning-relevant personal resources of the students identified as “weak” and “strong,” as opposed to their mixing (Dar & Resh, 1981).

Socio-economic status (*SES*): A classification of the population based on its income that differentiates between the low and high SES (Burchinal et al., 2011, p. 1,405).

Inner-city students: The concept of inner-city students represents students from urban environments that mostly come from racial minorities, low SES backgrounds, and who have low proficiency rates on standardized assessments and high dropout rates (Gill, 2011, p. 282).

Achievement gap: A phenomenon that represents the discrepancy between the level of academic achievement and consequential post secondary and career opportunities that correlates with the racial, ethnic, and socio-economic background of the students (McKown, 2013, p. 1,120). Specifically, the phenomenon refers to the greater levels of academic achievement of the students from the racial majority (White) and the lower academic achievement of the racial minority students (Black or Hispanic) (Olszewski-Kubilius et al., 2004, p. 128).

No Child Left Behind Act of 2001(*NCLB*): An iteration of the 1965 Elementary and Secondary Education Act, the NCLB Act serves to “close the achievement gap with accountability, flexibility, and choice” (NCLB, Sec. 1).

Title I funding: Originally enacted under the initial Elementary and Secondary Education Act of 1965, and then reinstated by the NCLB Act of 2001, represent the additional funding that the schools receive to ameliorate the effect of poverty through remedial and enriching instruction (Barela, 2008, pp. 531–532).

Significance

The original controversy between the concepts of heterogeneous and homogeneous classrooms dealt with the students of similar backgrounds and rests on the work of Slavin (1978, 1981, 1987, 1990) and Kulik and Kulik (1982, 1984, 1987, 1991). However, with the NCLB (2001), the idea of homogeneous and heterogeneous classrooms came to represent a whole new dichotomy. In this dichotomy, homogeneous classrooms based on students' abilities are almost exclusively available to the nonminority students from the high SES backgrounds, whereas the heterogeneous classrooms are a norm in the low SES environments (Attewell & Domina, 2008; Barela, 2008; Phillips, 2008; Olszewski-Kubilius et al., 2004; Riegle-Crumb & Grodsky, 2010). The type of curricula and instruction that students in these two learning environments receive captures the very essence of the Title I funding (Barela, 2008). On one side, inner-city, low SES, and minority students have very little differentiation between instruction and advanced or enrichment learning, whereas on the other side, their suburban nonminority peers traditionally enter advanced educational and career paths regardless of their given ability level (Attewell & Domina, 2008; Grodsky & Riegle-Crumb, 2010; Loveless, 2009; McAllister & Plourde, 2008).

Research shows that environments that use ability grouping of students through tracks of mathematics classes have a greater number of advanced and proficient students, although the opposite also holds true; the ineffective, nongrouped mathematics classes produce a great number of failing and at-risk students (Loveless, 2009). Pigeonholed into heterogeneous classrooms that lack the capacity to differentiate instruction and learning, inner-city students lack the educational landscape that can maximize learning for all students, despite their individual learning capacities. Consequently, it is important to look at the effect of heterogeneous and homogeneous groupings of students and multiple curricular tracks in inner-city environments as a foundation for improving a track record of children left behind.

The purpose of this study was to examine the effectiveness of ability grouping among inner-city students as an instructional intervention that can facilitate and expedite the level of academic achievement. In light of the Title I funding, which recognizes the need for academic interventions to allow some students increased opportunities to compete more effectively with their higher-achieving peers, this study examines the effect of homogeneous grouping as an extension of these programs. The study seeks to reexamine the “2008 Brown Center Report on American Education” that found that each additional track of mathematics curriculum increased the number of advanced students by 3% (Loveless, 2009). Specifically, this study examines the outcomes of heterogeneous and homogeneous grouping in mathematics in terms of the students’ achievement on the Northwest Evaluation Association Measures of Academic Progress (NWEA-MAP) assessments relative to their mathematics class placement (Algebra I or 8th grade Common Core State Standards [CCSS]). Given that the first student grouping campaign in the United States that took place in Detroit in 1919, we stand at the same crossroads of ability grouping and ponder the same question (Kulik & Kulik, 1991).

Attewell and Domina (2008) concluded a longitudinal panel study that examined the effect of curricular and instructional opportunities that the students received between eight and 12th grade in terms of the content and subject matter on their post secondary and college prospects. With a sample of 8,412 participants, and the official data from the National Educational Longitudinal Study (NELS), the researchers identified students SES as the greatest predictor of curricular intensity and further educational outcomes (Attewell & Domina, 2008). The educational split that took place in the middle school years permanently bifurcated the academic trajectories of the students in low and high SES. This study plays a crucial role in identifying the potential pathways of expediting the achievement of inner-city students (Allimann-Brissett & Turner, 2009; Oszewski-Kubilius et al., 2004; Riegle-Crumb & Grodsky, 2010; Young, Worrell, & Gabelko, 2011). Given the findings of the Brulles, Saunders, and Cohn (2010) and the Brulles, Peters, and Saunders (2012) studies that demonstrated quantifiable advantage in terms of student achievement for gifted students in high SES environments, it may be beneficial to look at the ways similar ability grouping of students can affect the achievement of the low SES inner-city students (Barela, 2008; Brulles, Saunders, & Cohn, 2010; Brulles, Peters, & Saunders, 2012; Finkel, 2010; Grodsky & Riegle-Crumb, 2010; Harwell & LeBeau, 2010).

The significance of this study emerges from the marriage of two leading educational concepts: (a) the ability-grouping of students that Kulik and Kulik (1992) espoused 30 years ago and (b) the eradication of the achievement gap in inner-city environments that rests on the educational framework of the NCLB Act (Allimann-Brissett & Turner, 2009; Emdin, 2011; Finkel, 2010; Grodsky & Riegle-Crumb, 2010; Kafi, 2012; Kulik & Kulik, 1992; Lapayesse et al., 2014; Young et al., 2011).

Specifically, the study compares the mathematics growth, measured by the NWEA-MAP points in mathematics, of two groups of eighth-grade inner-city students (2012–2013/control and 2013–2014/treated). This study consequently focuses on the educational pathways that can help close the achievement gap in Michigan between the low-SES, minority students from the inner-city schools (29.4% proficiency levels, and the 18.8 ACT composite score) and the non minority students from affluent environments (70.9% proficiency levels, and the 26.1 ACT composite score; Michigan School Data, 2015). Contingent on its findings, this study has the capacity to motivate a potential solution to the problem of underachieving students from inner-city Detroit in the form of a position paper and inform the necessary reform of public education in urban environments.

Guiding/Research Question

Given the multiplicity of sources in favor and against ability grouping of students, this study uses the meta-analysis of Kulik and Kulik (1992) as its theoretical framework. In their study, Kulik and Kulik (1992) examined a body of independent studies that took place between the 1970s and 1990s and quantitatively examined the scope of academic achievement of the students in grouped and nongrouped cohorts (Kulik and Kulik 1982, 1984, 1987, 1991; Slavin 1978, 1981, 1987, 1990). In this meta-analysis, Kulik and Kulik provided the foundation for a number of research studies on ability grouping that has emerged in the past 20 years. By looking at the different levels of curricular adjustments that take place in modern schools like inclusive classrooms, cluster grouping within and across classes, and enrichment classes for gifted and talented, Kulik and Kulik found that only substantial curricular adjustments produced substantial academic gains in students.

While the greatest gains took place in the higher ability subgroups within the grouped cohorts, the researchers did not find a negative effect on the lower ability students' self-esteem or their overall performance relative to the pre grouping comparison phase (Kulik & Kulik, 1992).

Research Questions

RQ_1—Is there a difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the nongrouped and ability-grouped eighth-grade inner-city students?

RQ_2—Is there a difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups of the ability-grouped eighth-grade inner-city students?

Hypotheses

$H_0$1*:* There is no difference between the ability-grouped 8th grade inner-city students and the nongrouped 8th grade inner-city students in terms of their mathematics achievement on the NWEA-MAP tests.

$H_1$1: There is a difference between the ability-grouped 8th grade inner-city students and the nongrouped inner-city 8th grade students in terms of their mathematics achievement on the NWEA-MAP tests.

$H_0$2: There is no difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups within the ability-grouped 8th grade inner-city students.

$H_1$2: There is a difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups of the ability-grouped 8th grade inner-city.

Review of the Literature

Topics Overview and Literature Search

To position this research in the greater landscape of scholarship, it was crucial to cast a wide net and examine research findings that relate to the ability grouping of students, achievement gap, and inner-city demographics and income. Goals for the review of literature included a better understanding of the political framework for the educational problem, as well as the success and failure of similar research projects. It was crucial to begin from the initial attempts to contextualize the phenomenon of ability grouping in education and identify the founders of the original idea. The span of two decades of scholarly arguments between Slavin and Kulik and Kulik set the framework for virtually all studies and research that examined student grouping since the 1990s. Two decades after the great debate of 1993, their works are still relevant and influential in the way schools run their daily schooling.

An overarching goal for my review of literature was to remain focused on the main context of the problem – inner-city schools. It was important to identify the political framework and different policies that delineate between different types of schools and individual programs that they provide. It was also important to identify the concrete evidence of the existence of the achievement gap and the way it affects students from the inner-city environments. In this search, it was beneficial to understand the concept of reality pedagogy and the ways schools require cultural relevance to achieve success (Emdin, 2011). It was also beneficial to find that enrichment programs in inner-city schools, where they exist, have the capacity to increase proficiency levels and overall academic achievement of the students (Barela, 2008; Young et al., 2011). In addition, it was important to look into the effect of resegregate classrooms onto students' sense of self-efficacy and life outcomes, including prospects related to demographic and SES background (Delpit, 2012; McKown, 2013). Finally, it was important to identify concrete evidence from the national, longitudinal NELS study that substantiates the discrepancy in the educational quality in inner-city environments on the one end, and the educational quality in affluent, suburban environments on the other (Attewell & Domina, 2008).

Literature Review

The idea of education for all, and the idea of education as a vehicle for a democratic society began with the works of Dewey (1922). It is through the explorative experiences that are fun and engaging that children learn best, yet most of the learning takes place in traditional settings of passive reception of information from the teacher (Dewey, 1922). Throughout the years, we have grown more cognizant of the engaging pathways for learning, yet we are still remote from democratic classrooms that empower all children. In the 1960s, we struggled and fought to desegregate schools and the society, and we won. However, the institutionalized segregation that openly denied educational opportunities for minorities gave way to the spontaneous re-segregation of the communities (Barela, 2008; Delpit, 2012; Kafi, 2012; Reardon, 2012; Simms, 2012). Divided along the lines of poverty and wealth, people and their children fell within the preset mold for most life opportunities; the scarcity of resources quickly translates into educational deficit and career limitations. Hence, the achievement gap has emerged—the great divide between the educational pathways that lead to high- and low-paid careers and opportunities (Barela, 2008; Delpit, 2012; Kafi, 2012; Reardon, 2012; Simms, 2012).

The concept of an achievement gap translates into education that offers vastly different outcomes for the students relative to their SES and demographic background. As such, inner-city schools lack the resources, instructional staff, and the multi leveled curricula that meet all children at their individual level of knowledge and skill (Attewell & Domina, 2008; Delpit, 2012; Loveless, 2009). Consequently, countless inner-city children undergo schooling as an underperforming unit that questions students' natural capacity to learn in the light of their obvious racial, ethnic, and SES delineations and stereotypes (Braun et al., 2010; Delpit, 2012; Emdin, 2011; Gottfried, 2014; Levy, 2008; Li & Hasan, 2010; McKown, 2013; Persell, Catsambis, & Cookson, 1992). Without the necessary exposure to the competitive curricula and education, inner-city children remain on the bottom of the societal distribution of knowledge, wealth, and life prospects. Given all of the information that identifies the underlying causes of the achievement gap, it is unclear why, 13 years since the NCLB Act, we still linger in the achievement gap (Braun et al., 2010; Delpit, 2012; Olszewski-Kubilius et al., 2004; Veltri, 2008). Despite the billions of Title I dollars for amelioration and remediation of education for the disadvantaged, the choice of educational solutions remain within the income-achievement framework (Braun et al., 2010; Delpit, 2012; Olszewski-Kubilius et al., 2004; Veltri, 2008).

Conversely, some scholars believe in the possibility of eradicating the achievement gap (Barela, 2008; Braun et al., 2010; Olszewski-Kubilius et al., 2004; Veltri, 2008). However, such transformation of the educational opportunities seeks a more radical approach to problem solving of the daily school in the inner-city classrooms. Rather than treating inner-city students as a compact of underperforming, uniformly minded, and aggressive individuals, I have looked at the ways in which multi leveled instruction through ability grouped learning cohorts could influence the academic achievement of the inner-city students. The concept of student grouping is buttressed in the great debate of the 1980s and 1990s wherein numerous studies examined the effect of student grouping on academic achievement (Kerchkoff, 1986; Kulik & Kulik, 1993; Slavin, 1987a, 1987b; Sorensen & Hallinan, 1986; Wilkinson, 1988). While the argument against grouping questioned the way it affected students' emotional being, there was also evidence of the positive impact that ability grouping had on students, especially those who had the potential for increased workload and advanced topics (Kulik & Kulik, 1993). In the more recent report on tracking and detracking effects in Massachusetts schools, Finn and Winkler (2009) found that schools that allowed for multi leveled instruction outperformed schools without the leveled instruction (Barela, 2008; Loveless, 2009). Moreover, schools that endorsed multi leveled instruction with ability grouping of students consistently produced a greater percentage of advanced and high achieving students (Barela, 2008; Loveless, 2009).

Furthermore, the great longitudinal panel study that Attewell and Domina conducted in 2008 with a sample of 8,412 participants and the official NELS data demonstrated direct connection between the educational pathways from the 8th grade to high school graduation and the ultimate career outcomes (Attewell & Domina, 2008). Based on the simple availability of classes in the middle school grades, students undertook vastly different educational roads in high school, which ultimately led them to different educational outcomes (Attewell & Domina, 2008). As such, students who attended inner-city schools with a limited offer of courses ended up with an extremely low realization of post secondary opportunities (Attwell & Domina, 2008; Delpit, 2012; Kafi, 2012; Olszewski-Kubilius et al., 2004; Olszewski-Kubilius, 2010). Conversely, the schools from the high SES environments differentiated their curricula to offer multi leveled classes and attend to the various learning needs of their students which ultimately ensured the students' pathways into and through colleges (Attewell & Domina, 2008; Riegle-Crumb & Grodsky, 2010).

Given these findings, it is beneficial to look at the Brulles, Saunders, and Cohn (2010) and the Brulles, Peters, and Saunders (2012) studies which quantified the improvement in the level of student achievement for gifted students in high SES environments as a result of ability grouping. To make a meaningful impact for the inner-city youth, it is crucial to look at the specific practices of the high performing environments and infuse them into new Title I programs (Alliman-Brissett & Turner, 2010; Brulles et al., 2010; Brulles et al., 2012; Delpit, 2012). By allowing access to better matched instruction that designs the curriculum around individual students' needs and capacities, inner-city schools can close the achievement gap (Colangelo et al., 2004; Emdin, 2011; Phillips, 2008; Young et al., 2011). With the culturally literate approach to ability grouping, inner-city schools can capitalize on the Title I support that they receive (Cheung & Rudowicz, 2003; Emdin, 2011; Mamary & Rowe, 1985; Mavarech, 1991; McAllister & Plourde, 2008; Moon, Callahan, Tomlinson, & Miller, 2002). Ultimately, if the schools continue to focus solely on remediation, all of the talent in inner-city environments will dissipate. Without the necessary mirrors of success in the light of individual success stories in all inner-city environments, inner-city youth may lose the last beacons of hope and trust in education as the most tangible way out of poverty.

Implications

This research rests upon the idea of bringing ability grouped learning cohorts into inner-city schools as a means of increasing the achievement of the inner-city students. Consequently, this study has immediate implication in the setting of a bankrupt city wherein African American population exceeds 80% of the total city population with Whites composing slightly more than 10% of the city population (U.S. Census). In a city that faced and endured bankruptcy for more than a decade, whose 40% population lives below the poverty level, and only 29.4% of the students test proficient on standardized assessments, I am proposing a study to investigate this prime test bed for a new strategy for dealing with the achievement gap (U.S. Census; Michigan School Data, 2015). Given the newly approved $150 million funds from the Title I sources, an idea of ameliorating and eradicating the achievement gap, comes at the moment of great potential and open road for a great change (DPS, 2014-2015 Budget, 2015).

I used this study to examine the effect of ability grouping of 8th8th grade students at an inner-city middle school on their academic achievement measured by the standardized NWEA-MAP assessments. By comparing the ex post facto academic achievement growth scores within two school years, 2012--2013/control and 2013—2014/treated, this study used a quantitative design that offered a perspective on ability grouping in inner-city classrooms. Through this study, I aspire to capture the effect of multi leveled curricula on the academic development and growth of the inner-city students and provide an alternative to the underperforming educational environment in urban schools.

Summary

In summary, this study has been designed to look for evidence of ways that different instructional and curricular strategies can close the achievement gap in the inner-city schools. Specifically, the study looks at the effect of ability grouping of inner-city students as a means of improving their achievement in mathematics. The research uses the foundational work of Kulik and Kulik (1993) whose quantitative meta-analysis substantiated the positive effect of ability grouping. The study also looks at the way multi leveled curricula that showed greatest effect on student achievement in middle schools in Massachusetts can grow through the cracks in the urban concrete (Attewell & Domina, 2008; Kafi, 2012; Loveless, 2009). Through this study, I intend to identify the ways in which the achievement gap between the inner-city students and the students from affluent suburbs might be closed.

Section 2: The Methodology

Research Design and Approach

This study used an ex post facto quasi-experimental design to measure the effect of ability grouping on eighth-grade students' achievement in mathematics. The ex post facto aspect of the study comes from the readily available NWEA longitudinal data of two school years that compile student scores at the beginning of the school year, in September, and at the end of the school year, in May. Given that real-life school settings do not allow for pure experimental designs due to their preexisting dynamics, student clusters, and cohorts, a quasi-experimental design allows for the evaluative examination of a given program without the abrupt manipulations of the environment or vast cost to the educational environment (Creswell, 2012; Dong & Maynard, 2013). Moreover, the quasi-experimental design is particularly suitable given the nonrandom assignment of the groups (e.g., using the standardized NWEA-MAP assessment scores to group students) (Dong & Maynard, 2013; Randler & Bogner, 2008). Finally, given the ex post-facto nature of the study that looks at the student achievement in the preceding years, 2012—2013/control and 2013—2014/treated, all data on the effect of grouping came from the archival sources without any delineation of individual identity of any student (students are only listed by their grade level and their randomly generated student identification).

Given the two-fold nature of this study, it is important to look at each aspect separately. On one hand, this study seeks to examine whether the ability grouping of students in 2013—2014/treated had any effect on student achievement relative to achievement of the nongrouped students in 2012—2013/control. The study also sought to identify whether the ability grouping only benefitted the higher-achieving cohorts or if the effect equally influenced both treated groups. Consequently, the research plan included the comparison of student performance on the NWEA-MAP assessments within one school year relative to the type of curricula that the students followed. In 2012—2013/control, all eighth-grade students received instruction in Algebra I regardless of their achievement on the NWEA-MAP assessments. In 2013–2014, four cohorts of the higher scoring students received instruction in Algebra ICCSS curricula, whereas the other four cohorts of lower scoring students received instruction in eighth-grade CCSS curricula. In both school years, the school administered the NWEA-MAP assessments that documented student achievement for the preceding year.

Within the theoretical framework of Kulik and Kulik's (1993) meta-analysis, it is important to *nest* the current study within similar quantitative premises. Conversely, given the achievement gap, NCLB, and Title I funding that discern between the at-risk, low, average, and advanced students based on standardized assessments, it is important to use the same instruments that classify students in the same achievement categories. Moreover, the consistent use of the NWEA-MAP assessments allows for an accurate longitudinal comparison of the performance of the students in the control, nongrouped 2012–2013/control cohort, and the performance of the treated, high- and low grouped 2013–2014/treated cohorts. Keeping the teaching staff consistent within each of the school years, it is plausible to assume that the ability grouping in a quasi-experimental environment was the main influence on the student achievement. Finally, by looking at the academic achievement growth on the same NWEA scale, my intention is to gauge the effectiveness of the two types of curricular and instructional solutions to the problem of student achievement in inner-city classrooms.

Setting and Sample

The study took place at an inner-city charter that serves majority African American student population and provides 90% free or reduced price lunch (MI School Data, 2015). To minimize the risks of identifying the student population and the teaching staff, the research site is referred to as College Prep Middle School (CPMS) a pseudonym. The student body at CPMS does not come from a single school district or neighborhood. Rather, students at CPMS come from all parts of Detroit and hence may provide a representative sample of the students in the city. Given the U.S. Census data (40% of the Detroiters below the poverty level, and 80% are African American), the CPMS student body (majority African American and at 90% of which receive free or reduced-price lunches) represents a unique environment to test the effect of academic interventions, such as ability grouping, on academic achievement of this traditionally underperforming demographic (Attewell & Domina, 2008; Kafi, 2012; Loveless, 2009; Michigan School Data, 2015; US Census, 2015). Finally, given the student academic proficiency level of less than 30% on standardized assessments; its faculty of veteran, novice, traditional, and alternatively certified teachers; and its 2013–2014 experimentation with the ability grouping model, CPMS provides unique and rich research environment for studying ways to decrease achievement gaps, when they exist, between inner-city and more-successful suburban schools.

CPMS is a school that serves close to 400 students. Each year the school graduates between 110 and 130 students. Each grade level has eight advisory model cohorts who follow the same core curriculum and attend all core classes together. The schedule and the model remained the same in 2013—2014 except for the 8th grade students in mathematics. Only during mathematics, the students separated from their advisory and attended a class that matched their ability level. The study used CPMS as its unit of analysis, with appropriate random samples from the population of all 8th grade students who took both the pretest and posttest NWEA-MAP assessments during the two years that the grouping strategy was in place (Delice, 2010; Taylor, Olver, & Murphy, 2011). Students who missed one or both tests were omitted from the analyses because the research design required the comparison of pretest and posttest scores (Castillo, 2009; Creswell, 2012; Delice, 2010).

To determine the approximate sample size for the study, I have used two sources including (a) Krejcie and Morgan’s (1970) table for sample size from a given population, and (b) the G Power Analysis software. According to the Krejcie and Morgan’s table (1970), the CPMS student population (400 students in Grades 6–8) would require a sample of 196 students, while the population of 140 8th grade students alone would require the sample of 103 students (Krejcie & Morgan, 1970). To substantiate the suggested sample size from the table, I have used the G Power Analysis for a one-way ANOVA with a medium effect size of 0.25, error probability (α) of 0.10, and power ($1-\beta$) of 0.9, for 3 groups which suggested the minimal sample size of 171 students. Given these recommendations, the study will use the available archival student records of 230 students between the two school years, 2012—2013/control and 2013—2014/treated.

Table 1

G Power Analysis of Sample Size

F tests - ANOVA: Fixed effects, omnibus, one-way			
Input		Output	
Effect size *F*	0.25	Noncentrality parameter λ	10.6875
α err prob	0.1	Critical *F*	2.33443
Power (1-β err prob)	0.9	Numerator *df*	2
Number of groups	3	Denominator *df*	168
		Total sample size	171
		Actual power	0.90217

The longitudinal nature of the data within each of the compared school years, the one-way analysis of variance (ANOVA) has the capacity to evaluate the quantitative outcome of the independent categorical explanatory variable (grouping of students) with three treatment levels (nongrouped, high grouped, and low grouped) of which only one level is applied at any time (Faul, Erdfelder, Land, & Buchner, 2007; Seltman, 2014; Triola, 2012). ANOVA variance test has the capacity to compare the mean differences in the student achievement (dependent continuous variable) fall-spring for both school years, 2012—2013/control and 2013—2014/treated, and all three cohorts, nongrouped, high grouped, and low grouped (Faul et al., 2007; Seltman, 2014; Triola, 2012).

In terms of recruitment for the grouped cohorts, the eighth-grade CPMS mathematics teachers analyzed the 2012—2013 NWEA-MAP assessment data and grouped the rising 8th grade students into new learning cohorts. The teachers ensured that the composition of the new cohorts allowed for efficient instruction by minimizing the behavioral friction between students with behavioral history and evenly distributing the same-range achievers between the four ability cohorts of each level. Consequently, all high grouped cohorts mirrored each other in composition (e.g., gender, race, and NWEA achievement), curriculum, and the instructional solutions to the curricular roadmap for the treated 2013—2014 school year. The same was true for the low grouped cohorts.

Instrumentation and Materials

This study used the NWEA-MAP assessments to gauge the mathematics growth of the students in both controls and treated cohorts. NWEA-MAP is a computer adaptive interim assessment that partner schools administer three times a year to gather the longitudinal data on the students' mathematics growth and achievement within that school year (NWEA-MAP). NWEA-MAP is untimed, and it allows for a personalized, performance-based, individually adaptive assessment that gauges each student's individual academic mastery (NWEA-MAP). According to the NWEA website, other than offering adaptive interim assessments, NWEA provides "the most stable scale and data in the assessment industry" (NWEA-MAP). Given its ability to measure the growth of every student regardless of their performance level (below, above, or on the grade level), NWEA-MAP assessment data has the capacity to inform teachers of the skill and ability level, as well as the overall mastery relative to each grade level (NWEA-MAP). NWEA-MAP assessments provided an invaluable foundation for the ability grouping at CPMS.

Outside of the NWEA website and its own source of validity and reliability, there are numerous recent studies that use the NWEA-MAP assessments as a yardstick for measuring the effect of student grouping, tracking, instructional practices and solutions, and the raw comparison of the student achievement in public and charter school. As such, Berends and Donaldson (2011) looked at the differences between the uses of ability grouping in public and charter schools relative to the NWEA-MAP academic achievement of students in mathematics. Berends and Donaldson were able to link the survey responses of 1,071 mathematics teachers to the achievement scores of their 16, 501 students in 146 participating charter and public schools (Berends & Donaldson, 2011). Consistent with this study, Berends and Donaldson found that ability grouping took place more often in charter public schools and consequently yielded greater mathematics growth of the students than those in nongrouped public schools.

In their study on school choice, Stein, Goldring, and Cravens (2010) used the school AYP data and the NWEA-MAP assessment data to classify schools as higher or lower performing (Stein, Goldring, & Cravens, 2010). Conversely, the U.S. Department of Education sponsored a study and published a final report on the relationship between the benchmark assessments and the level of instructional differentiation in response to the benchmark performance and achievement (Cordray et al., 2012). According to this report, more than 20% of schools and school districts nationwide use NWEA-MAP assessments and are increasingly joining its camp due to its greatest repository of data on student growth (Cronin et al., 2007 in Cordray et al., 2012). And while the report does not find an increase in differentiated instruction in schools that use NWEA-MAP assessments, it does recognize that MAP tests that are readily available to partnering schools align with the state mandated standardized assessments (Cordray et al., 2012).

Finally, in their study of various degrees of proficiency requirements across states, Durant and Michael (2011) used NWEA-MAP assessments as a common ruler to level out the playing field of various state assessments of various scales. In their study, Durant and Michael cited previous findings that correlate student performance on MAP assessments with the student performance on state mandated standardized assessments (Durant & Michael, 2011). By introducing the single measure of academic success of students, NWEA-MAP, Durant and Michael were able to juxtapose the various scales of different states and contextualize the individual state proficiency requirements relative to the national achievement of the entire student body.

NWEA-MAP assessments use the NWEA-RIT (research unit) scale to place each student on the learning continuum relative to their individual performance on the computer-based, performance assessment (NWEA-MAP). According to the NWEA sources, NWEA-MAP assessments have the capacity to predict each student’s performance on standardized and mandated assessments by looking at their specific skill range within each subcategory of the assessment. Specifically, the NWEA-MAP assessment in mathematics organizes questions into four distinct categories (Number Systems, Algebra, Geometry, and Statistics and Probability), which allows the teachers to dissect the specific performance of each student, as well as identify their individual strengths and weaknesses (NWEA-MAP). Consequently, each student is placed on four sub RIT continuums and one summative RIT scale range for their overall mastery of concepts in mathematics (NWEA-MAP). Given that the database contains over 34,000 assessment items, and the narrow window of 14 months to ensure that the questions administered to the same student never repeat, NWEA-MAP assessments indeed provide a universal ruler that can compare and trace the individual and group achievement of the students (NWEA-MAP).

Considering the archival nature of the data for the 2012—2013/control and 2013—2014/treated school years, the NWEA database does not provide any reference to the individual identity of any student. Instead, the NWEA database of assessment scores over the school years only stores the student achievement under the student's unique and encoded student ID number, linked to each given teacher who administered the test at the time of testing. The archival data provide a safe window for the academic achievement of the CPMS student without ever threatening their individual identity, wellbeing, and educational prospects. Moreover, given the archival nature of the data, any evaluation of the data will not have any influence on the immediate grades and graduation rates of the students from the sample. Consequently, the actual data tables with the encoded student achievement will supplement the Appendix B of this study. Appendix A is reserved for the project proper.

Data Collection and Analysis

In order to answer the research questions, the study will look at the archival data of the student achievement on the NWEA-MAP assessments in mathematics for the school years of 2012—2013/control and 2013—2014/treated. The archival data, previously encoded and de-identified from all personal information by the CPMS Central

Office, provide the raw scores of all students at CPMS listed under their randomly generated student IDs. Students from the control cohorts are encoded by the letter *C* and a random number. Students from the grouped cohorts are encoded by the letter *T* and a random number. As such, the available datasets of student achievement provide an invaluable source of relevant information that can trace the individual student IDs to each ability-grouped cohort without ever threatening the identity of any student. Moreover, the encoding of the student identity under their unique student ID prevented me from identifying any of the students. The original encoded and de-identified NWEA-MAP dataset is available in Appendix B.

Each of the three study cohorts (the nongrouped students in 2012—2013 and the two ability-grouped cohorts in 2013—2014) took the pretest NWEA-MAP assessment in September of each respective year. The scores that the students received at this time will serve as the baseline for the control and treated groups. At the end of each school year, in May or June of each respective year, the students from both cohorts, the nongrouped students in 2012—2013/control and the two ability-grouped cohorts in 2013—2014/treated, took a posttest NWEA-MAP assessment. The individual growth of each student between the pretest or baseline, and the posttest will provide the new set of data that will then serve as the foundation for the ANOVA analysis of the variability of the three means of student achievement (Creswell, 2012; Faul et al., 2007; Seltman, 2014; Triola, 2012). As such, the nongrouped, high grouped, and low grouped cohorts serve as a categorical independent variable. The dependent variable, individual growth within a school year, comes from a continuous interval scale, the Rasch Continuum of Knowledge scale (*RIT*), which NWEA-MAP uses to evaluate the mastery level of each student (Cordray et al., 2012; Faul et al., 2007; Seltman, 2014). To streamline further discussion of the scores, I will use NWEA-MAP score to represent the entire RIT scaling system. NWEA-MAP cores come from an equal interval scale that allows for standardized evaluation of students' performance independent from their level of proficiency and mastery on the RIT scale (Cordray et al., 2012). Each student score encompasses a set of academic skills regardless of the grade level of the student which further enables the computer-based NWEA-MAP assessment to provide individualized evaluation for each student. For example, two students of different grade levels could achieve the same NWEA-MAP score, but given their individual grade level the actual score could place them on a different level of achievement. When a sixth grader scores 240 on the NWEA-MAP scale, they have achieved the 80th percentile of mastery; on the other hand, when an eighth-grader scores the same 240 on the NWEA-MAP scale, their mastery level is at the 65th percentile of mastery (NWEA-MAP).

Given the nature of the research questions and the hypothesis on the one hand and the convenience sample of the CPMS 8th grade students, the study will have the capacity to only provide a descriptive analysis of the student achievement dynamics at the sight of the study (Creswell, 2012; Delice, 2010; Randler & Bogner, 2008). Nevertheless, the study has the capacity to begin a discussion about the potential of ability grouping in similar inner-city environments to close the achievement gap. Consequently, whereas the study will only provide an inferential analysis of the two sets of data at CPMS, it can also serve as a spring board for more complex research and inferential analyses.

Assumptions, Limitations, Scope, and Delimitations

Given the quantitative nature of a pretest-posttest quasi-experimental study, this study had to take place in a way that does not disturb or disrupt daily dynamics in CPMS. As such, it is imperfect in its effort to use two different sets of 8th grade students at CPMS, those in 2012—2013/control and 2013—2014/treated, as comparison groups under the assumption that if they share the same characteristics of demographics, SES background, and the teaching staff, they would suffice the criteria for the control and treated groups. In addition, the study rests on the assumption that the quality of instruction that the students of all three groups received within each school year remained consistent.

Due to its convenience sampling, the study only has the capacity to make inferences about the specific microcosm of CPMS. Also, the study rests upon the simple premise of categorical grouping of students without the qualitative evidence of the strength of each program. As such, the study only serves to begin a larger discussion in education that seeks to explore, understand, and solve the problem of underachievement in inner-city environments. Within its current capacity, the study can only infer the effect that the ability grouping of 8th grade students had on their academic achievement on NWEA-MAP assessments.

The study examined the problem of academic achievement within a narrow scope of analysis. Specifically, the study delineated between two sets of categorical variables. To answer the first research question, the study looked at the way two treatment levels of the independent categorical variable (nongrouped and grouped cohorts) influenced the dependent interval variable of student improvement within each school year. To answer the second research question, the study looked at the way two treatment levels within of the independent categorical variable within grouped cohorts (high grouped and low grouped) influenced the dependent interval variable of student improvement in 2013—2014. Finally, the study had clear boundaries of examining the effect of ability grouping of a specific group of students, 8th grade, at a single location, CPMS.

In terms of the limitations of the study, the study only examined at the quantitative data of student achievement within a single school year. The study only used the NWEA-MAP archival data to identify if there was a difference in the scope of improvement that the students achieved with and without grouping. The study did not look at the qualitative aspects of grouping that deal with individual and group perceptions of the effect of grouping. The study consequently did not examine the effect that the grouping had on the students' sense of self-efficacy, emotional wellbeing, or the types of intelligences and learning styles that each of the groups could have undergone. As such, the study did not have the capacity to answer the deep questions of psychological dynamics within the groups. Its sole focus was to gauge the effect that the ability grouping had on the specific standardized NWEA-MAP assessments.

Protection of Participants' Rights

Given the nature of the study that looked at the academic achievement of middle-school-aged, 8th grade students at CPMS, it is natural to posit the question of the students' wellbeing, their rights, and the necessary measures to protect them (Creswell, 2012; Loyd 2012; McDonald, Kidney, Nelms, Parker, Kimmel, & Keys, 2009). However, this study did not face the same risks that come with the territory of student achievement primarily because its source of data was archival (Creswell, 2012). As such, any of the achievement data of the students has already become obsolete for their immediate educational pathways. On the other hand, the data were also encoded and de-identified by the data provider before they were provided to the researcher. Without any lineage to the individual identity of any student, the study does not have the capacity to threaten the disclosure of any relevant, sensitive, or personal information.

To ensure the fulfillment of the scholarly standards of ethical research, the study sought and obtained approval from Walden University's Institutional Review Board (IRB approval number 05-26-15-0408969). The study also sought and obtained written permission from the CPMS administration through the data use agreement and letter of cooperation.

Data Analysis Results

Through its quantitative design, this study measured the effect of student grouping as an instructional intervention on the students' achievement on standardized mathematics assessments within a single school year. The nucleus of this study was the premise of ability grouping of the inner-city CPMS 8th grade students as an instructional intervention that can expedite their achievement in mathematics (growth) within one school year. This study looked at the aggregate effect of ability grouping of the CPMS students on their overall growth on standardized, longitudinal assessments in mathematics. The study did not look into any qualitative aspects of ability grouping.

The study used the NWEA-MAP assessments and its continuous interval scale as a universal yardstick of achievement in mathematics between the control and treated cohorts. Given the longitudinal nature of the NWEA-MAP assessments, the study used the difference between the student scores in mathematics from the beginning of the school year and those from the end of the school year to create the continuous dependent variable, *mathematics growth*. For example, if a given student achieved a NWEA-MAP score of 220 in September and then the same student achieved 230 in May, their mathematics growth would be +10 NWEA-MAP score points. Conversely, if a given student achieved a NWEA-MAP score of 220 in September and then achieved 210 in May, their mathematics growth would be -10 NWEA-MAP score points. The following section presents the findings of the study.

RQ$_1$: Mathematics Growth Based on Standardized Mathematics Scores Between Nongrouped and Grouped Cohorts

To examine the effect of student grouping on the academic achievement in mathematics of the students on the longitudinal NWEA-MAP assessments, the study compared the mathematics growth of the CPMS 8th grade students from 2012—2013/control and those from 2013—2014/treated school years (RQ$_1$). To answer this question, the study used the archival, ex post facto student achievement scores from CPMS, data provider. Due to the necessity for the pretest-posttest difference in the student achievement scores, the study had to remove all partial raw data (e.g., students who only had one of the two necessary NWEA-MAP scores) from both cohorts. After the removal of the unusable data, the study had 115 pretest-posttest student achievement scores from the 2012—2013/control and 119 pretest-posttest student achievement scores from the 2013—2014/control. The study used a random number generator to remove four data points from the treated cohort and ensure equal sample size of the control and treated cohorts ($n = 115$ for each group). To compare the mean differences in the student achievement (dependent continuous variable), the study used a one-way ANOVA variance test (Faul et al., 2007; Seltman, 2014; Triola, 2012). All raw data, encoded with randomly generated student ID numbers by the data provider, CPMS, are provided in Appendix B.

Hypotheses. $H_0 1$: There is no difference between the ability-grouped 8th grade inner-city students and the nongrouped 8th grade inner-city students in terms of their mathematics achievement on the NWEA-MAP tests.

$H_1 1$: There is a difference between the ability-grouped 8th grade inner-city students and the nongrouped inner-city 8th grade students in terms of their mathematics achievement on the NWEA-MAP tests.

Results. The treated cohort had a greater increase in the level of mathematics growth between the pretest and posttest administrations of the NWEA-MAP assessments than the control cohort ($M_{treated} = 6.48$, $SD = 6.99$, $M_{control} = 4.24$, $SD = 6.62$). The F ratio, calculated as the mean square between groups divided by the mean square within groups is 6.24 and it is associated with a p value of .013. Given the necessary significance threshold of .05, I rejected the null hypothesis and found that there was a significant effect of student grouping on their academic achievement. Table 2 captures the descriptive statistics of the academic achievement of the students from the two cohorts.

On average, for each 4.2435 NWEA-MAP point score improvement by a student in the control cohort, a student from the treated cohort improved by 6.4870 NWEA-MAP points. Table 3 demonstrates the statistical significance in the variability of the means between the two cohorts, control and treated (*F* = 6.243, *p* = .013).

Table 2

Descriptive Statistics of Control and Treated Cohorts

		N	Mean	Std. deviation*	Std. error	95% confidence Interval for Mean		Minimum	Maximum	Between-component variance
						Lower bound	Upper bound			
Control		115	4.2435	6.61815	0.61715	3.0209	5.466	-13	22	
Treated		115	6.487	6.99419	0.65221	5.1949	7.779	-9	25	
Total		230	5.3652	6.88626	0.45407	4.4705	6.2599	-13	25	
Model	Fixed effects			6.80876	0.44896	4.4806	6.2499			
	Random effects				1.12174	-8.8878	19.6183			2.11347

*Given the spectrum of achievement levels from -13.00 to 25.00, large values of standard deviations do not mean that the mean variance is insignificant. Large values of standard deviations are rather associated with large scale of NWEA-MAP score points, and scattered values of individual student scores.

Table 3

One-way ANOVA for Math Growth: Control and Treated Cohorts

	Sum of squares	*df*	Mean square	*F*	Sig.
Between groups	289.409	1	289.409	6.243	0.013
Within groups	10569.913	228	46.359		
Total	10859.322	229			

To substantiate the original one-way ANOVA of the mean variance between the control and treated cohorts, the study created the third cohort based on the typical growth measure built into the NWEA-MAP test. According to the NWEA-MAP database, a typical student should improve by four NWEA-MAP points within a single school year (+4, NWEA-MAP). Specifically, the study added the third cohort, *typical-growth*, *n = 115* with each data entry at +4 NWEA-MAP points. With a new one-way ANOVA for the three cohorts (control, treated, and typical-growth) the study found a new *F* ratio of 6.99 and the associated *p* value of .001 and was able to confirm the initial rejection of the Null Hypothesis (Table 5). More importantly, by adding the third cohort, the study was able to run a post-ANOVA comparison, the Tukey HSD test between the control, treated, and the typical-growth cohorts. According to the Tukey HSD test in Table 6, there is a significant difference in the level of mathematics growth between the treated and the typical-growth cohorts (*p* = .002), and that between the treated and the control cohorts (*p* = .007). Such difference does not exist between the control and the typical-growth cohorts (*p* = .941).

Table 4

Descriptive Statistics of Control, Treated, and Typical-Growth Cohorts

		N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum	Between-component variance
						Lower bound	Upper bound			
Control		115	4.2435	6.61815	0.61715	3.0209	5.466	-13	22	
Treated		115	6.487	6.99419	0.65221	5.1949	7.779	-9	25	
Typical-growth		115	4	0	0	4	4	4	4	
Total		345	4.9101	5.65537	0.30447	4.3113	5.509	-13	25	
Model	Fixed Effects			5.55933	0.2993	4.3214	5.4989			
	Random Effects				0.79153	1.5045	8.3158			1.61082

Table 5

One-way ANOVA for Math Growth: Control, Treated, and Typical-Growth

	Sum of Squares	*df*	Mean square	*F*	Sig.
Between groups	432.301	2	216.151	6.994	0.001
Within groups	10569.913	342	30.906		
Total	11002.214	344			

Table 6

Tukey HSD Post Hoc Test: Control, Treated, and Typical-Growth

(I) Group type		Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
Control	Treated	-2.24348*	0.73314	0.007	-3.9693	-0.5177
	Typical-growth	0.24348	0.73314	0.941	-1.4823	1.9693
Treated	Control	2.24348*	0.73314	0.007	0.5177	3.9693
	Typical-growth	2.48696*	0.73314	0.002	0.7612	4.2127
Typical-growth	Control	-0.24348	0.73314	0.941	-1.9693	1.4823
	Treated	-2.48696*	0.73314	0.002	-4.2127	-0.7612

*. The mean difference is significant at the 0.05 level.

Discussion: How student grouping impacted CPMS students.

Given the quasi-experimental nature of this study that compared two different cohorts of students, it is important to note the comparability of the two groups (control and treated). Table 7 shows the breakdown of the raw NWEA-MAP scores for the control and the treated cohorts. Both cohorts started the school year with almost identical student achievement levels ($M_{control}$ = 223.12, *SD* = 14.155; $M_{treated}$ = 223.45, *SD* = 14.419), and they finished the school year with a 2.46 NWEA-MAP point difference in the aggregate student performance (M_{cntrol} = 227.37, SD = 14.946; $M_{treated}$ = 229.83, SD = 16.173). Given the typical growth that is built into the NWEA-MAP assessment scale (+4 NWEA-MAP points), this study demonstrated that the student grouping as an instructional intervention has elevated the student achievement by more than 50% compared to the nongrouped control. The Tukey HSD post hoc test demonstrated homogeneity of the subsets such that the control cohort performed consistently with the typical-growth projection, while the treated cohort demonstrated significant difference from the two (Table 8). Figure 1 graphically illustrates the mean score comparison between the control, treated, and the typical growth cohorts in which only the mean score of the treated cohort is plotted by more than 2.5 NWEA-MAP points above the NWEA-MAP mean scores of the control and typical-growth cohorts. Finally, Figures 2-5 illustrate the raw NWEA-MAP point score distribution of the student achievement for the control and the treated cohorts (pretest-Fall and posttest-Spring).

Table 7

NWEA-MAP Score Breakdown for Control and Treated Cohorts

Cohort type	Raw NWEA-MAP mean score Fall	Std. deviation	Raw NWEA-MAP mean score Spring	Std. deviation	*N*
Control	223.12	14.155	227.37	14.946	115
Treated	223.45	14.419	229.83	16.173	119

Table 8

Homogeneous Subsets: Control and Treated Cohorts

Tukey HSD[a] group type	*N*	Subset for alpha = 0.05	
		1	2
Typical-Growth	115	4	
Control	115	4.2435	
Treated	115		6.487
Sig.		0.941	1

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 115.000.

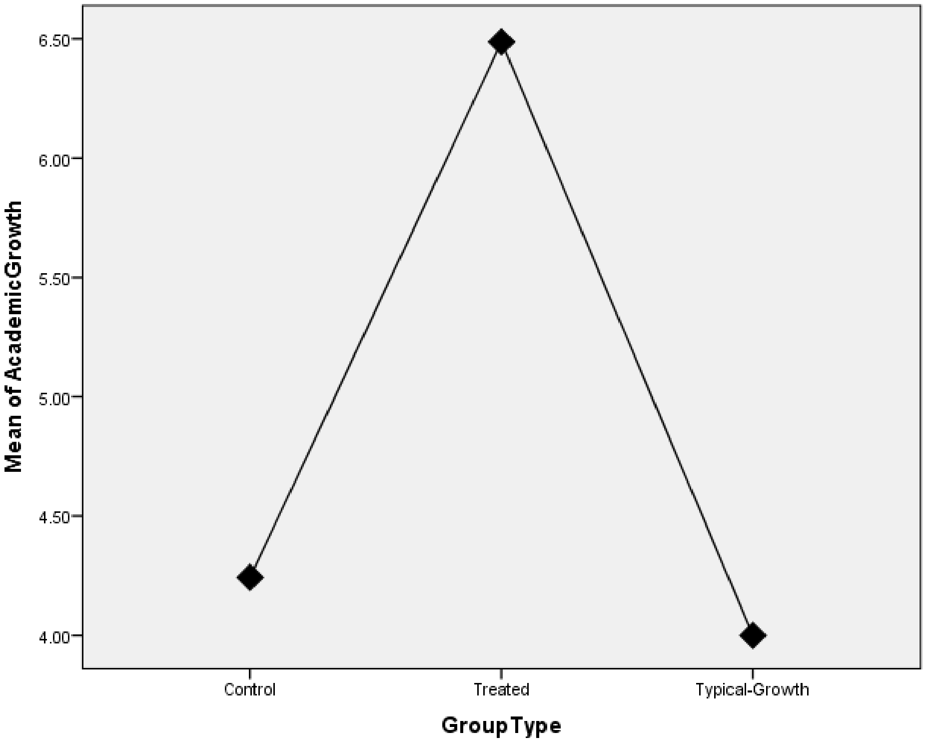

Figure 1. Means plots: $M_{control} = 4.24$, $M_{treated} = 6.48$, $M_{typical} = 4.00$.

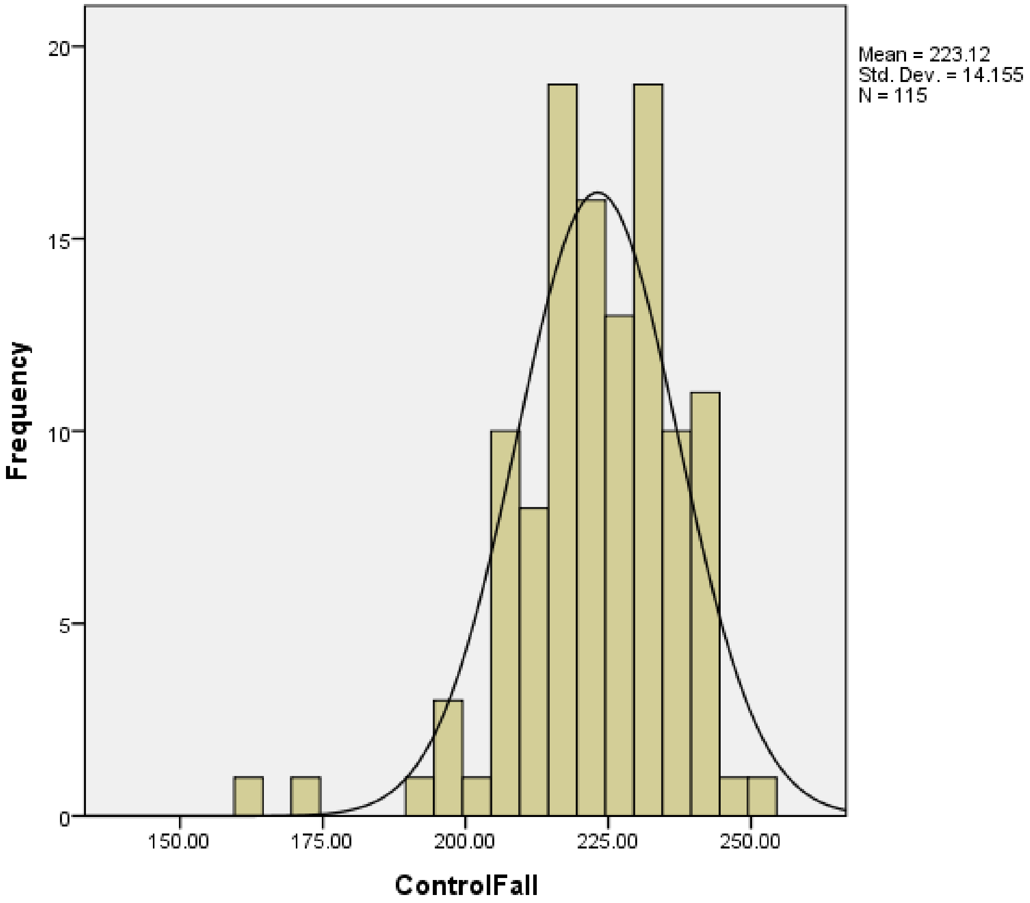

Figure 2. NWEA-MAP scores of the control cohort, Fall 2012.

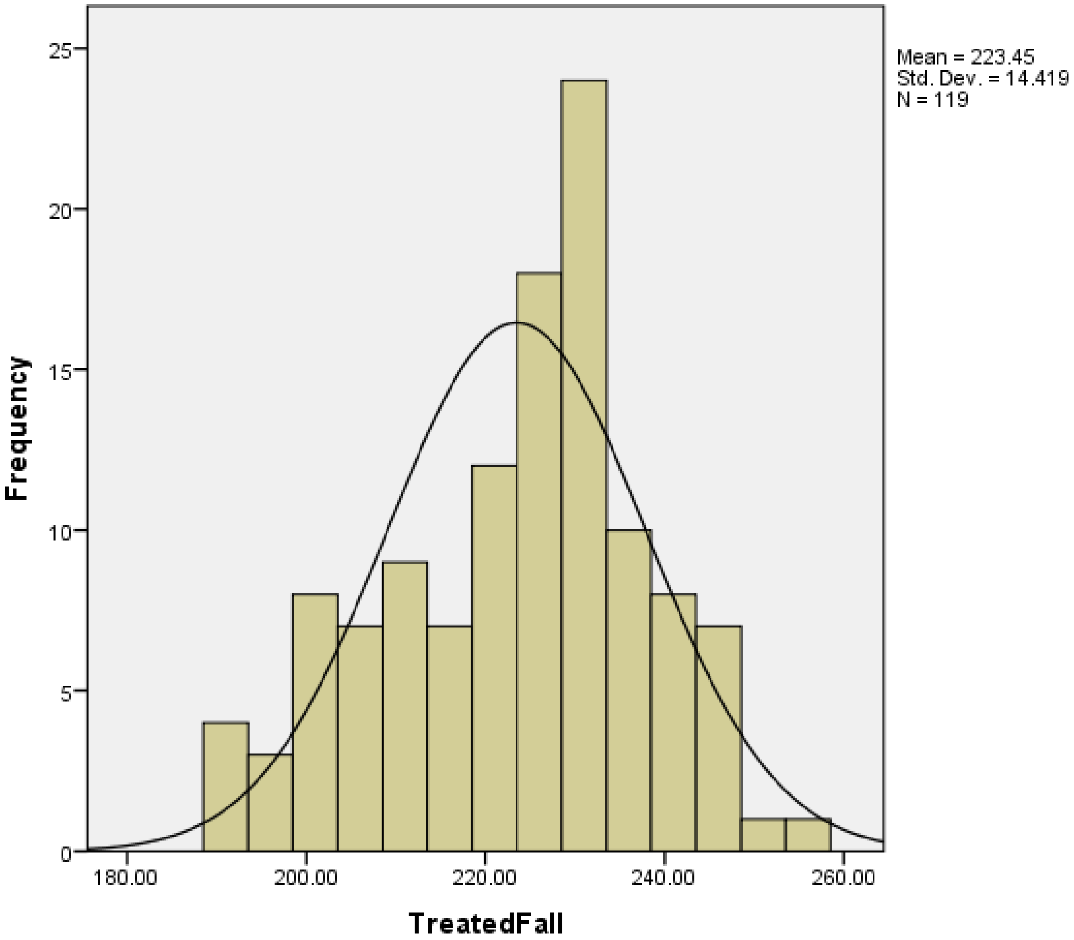

Figure 3. NWEA-MAP scores of the treated cohort, Fall 2013.

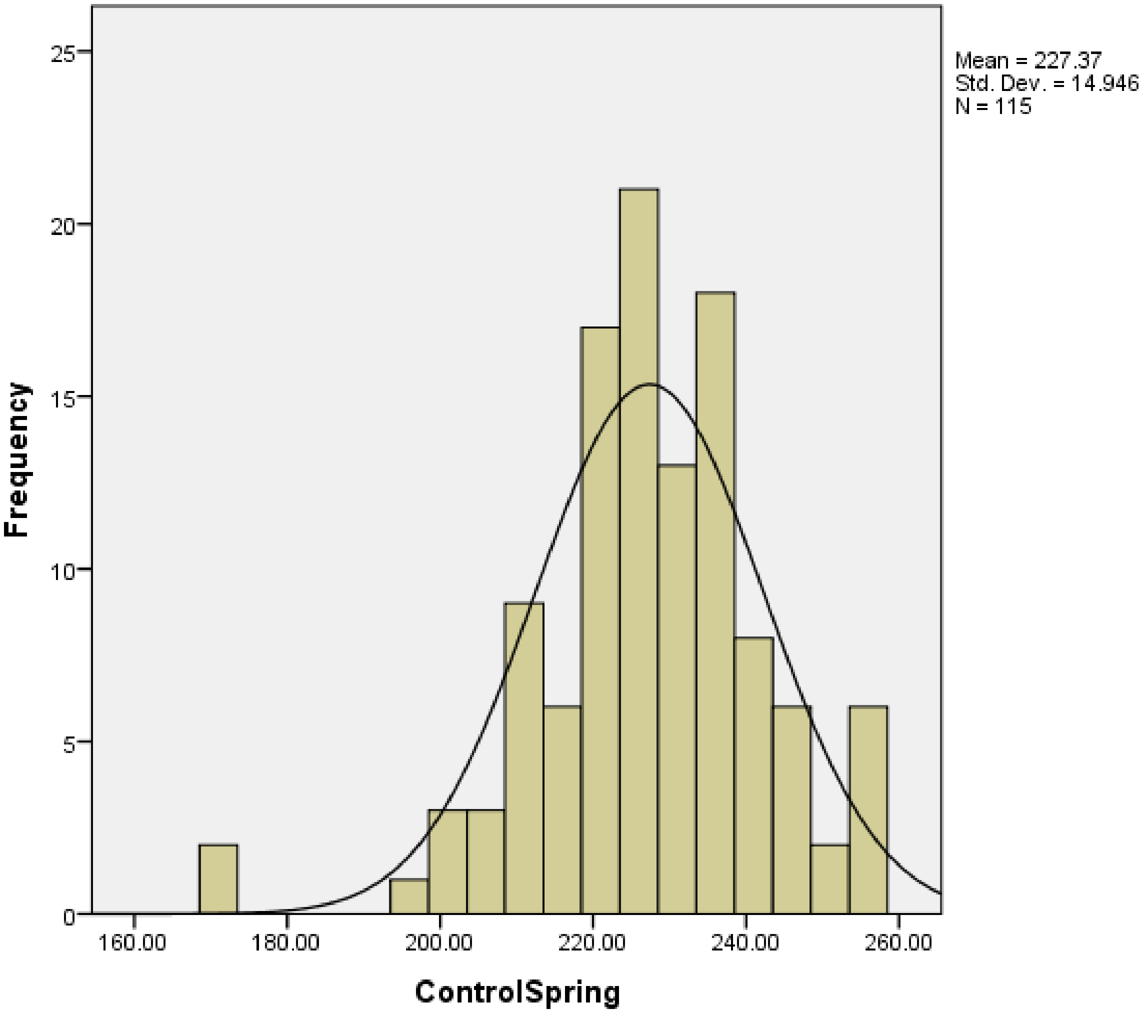

Figure 4. NWEA-MAP scores of the control cohort, Spring 2013

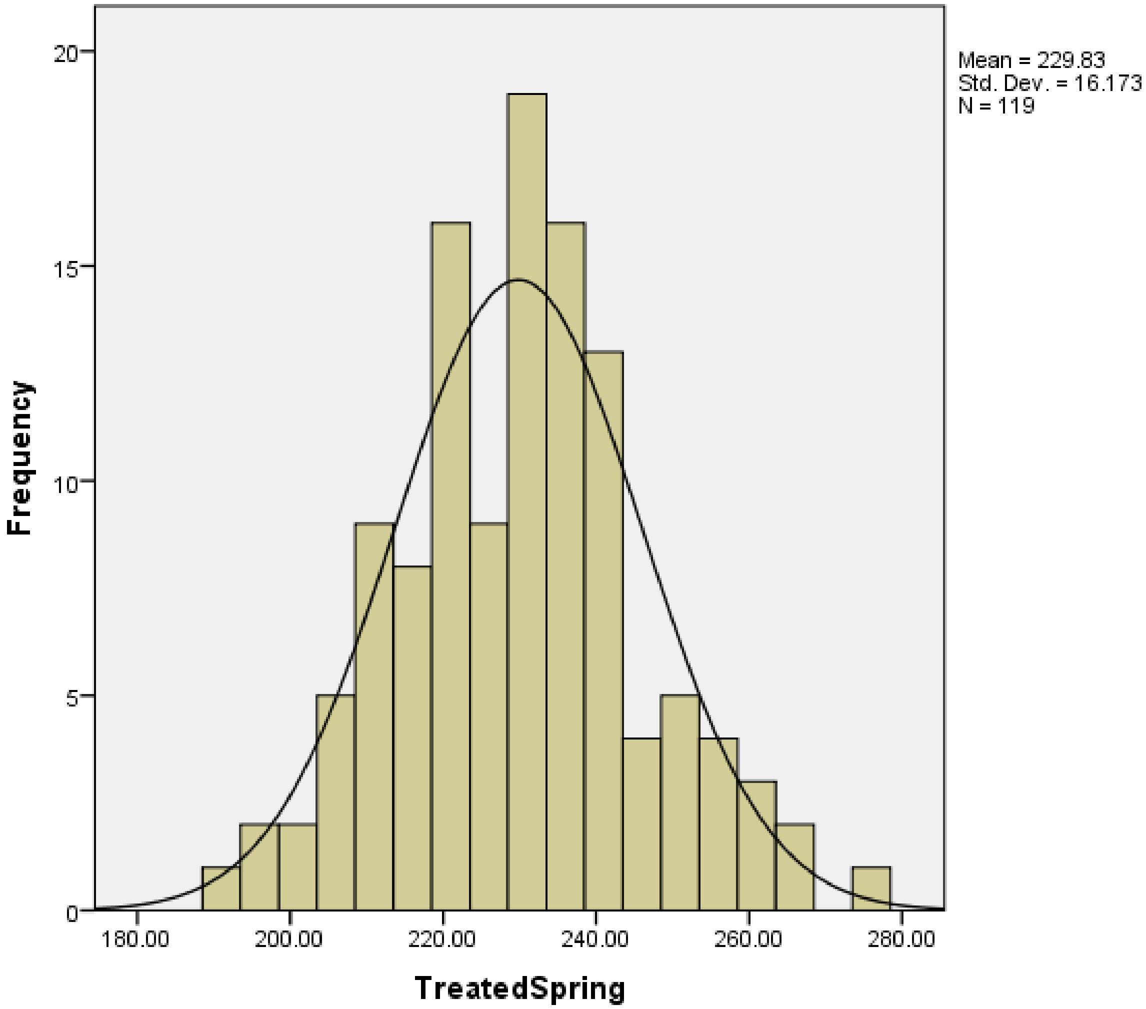

Figure 5. NWEA-MAP scores of the treated cohort, Spring 2014

RQ$_2$: Mathematics Growth Within Grouped Cohorts

To measure the effect of student grouping within treated cohorts, the study tested the mean variance between the high and low cohorts within the 2013—2014 treated cohort of the CPMS 8th grade students. After removing the partial data from the treated cohort (e.g. if a given student was missing either of the pretest-posttest scores), the treated cohort had a clean sample of 119 student scores. The treated cohort was comprised of two cohorts of high-ability (n = 64 students) and low-ability (n = 55) student cohorts. To ensure valid comparison of the two cohorts and avoid assumption violations due to the unequal variance in the two populations due to the sample size, I adjusted both samples to n = 55 (Triola, 2012). To accomplish this adjustment, I used SPSS's random number generator to eliminate nine score values from the high-ability cohort. With both cohort samples adjusted to n = 55, I then tested the difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups of the ability-grouped 8th grade students at CPMS (RQ_2).

Hypotheses.

$H_0 2$: There is no difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups within the ability-grouped 8th grade inner-city students.

$H_1 2$: There is a difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups of the ability-grouped 8th grade inner-city.

Results.

Even though the high-ability group had a greater increase in mathematics scores between the pretest and posttest administration of the NWEA-MAP assessments (M_{high} = 7.13, SD = 6.93) than the low-ability cohort (M_{low} = 5.58, SD = 6.73), the one-way ANOVA test did not show statistically significant variance between the means of the two cohorts (F = 1.41, p = .24). Given the necessary significance threshold of .05, I failed to reject the null hypothesis of no effect of the type of student grouping, high or low, on their academic achievement in mathematics. Table 9 provides a summary of the descriptive statistics pertaining to these two cohorts within the treatment group, and Table 10 shows the one-way ANOVA test results of the mean variance between the two cohorts.

Table 9

Descriptive Statistics for Low-Ability and High-Ability Cohorts

		N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum	Between-component variance
						Lower bound	Upper bound			
Low ability		55	5.5818	6.7294	0.90739	3.7626	7.401	-8	20	
High ability		55	7.1273	6.93369	0.93494	5.2528	9.0017	-9	25	
Total		110	6.3545	6.84506	0.65265	5.061	7.6481	-9	25	
Model	Fixed effects			6.83231	0.65144	5.0633	7.6458			
	Random effects				0.77273	-3.4639	16.173			0.34548

Table 10

One-way ANOVA for Math Growth: Low-Ability and High-Ability Cohorts

	Sum of squares	*df*	Mean square	*F*	Sig.
Between groups	65.682	1	65.682	1.407	0.238
Within groups	5041.491	108	46.68		
Total	5107.173	109			

Follow-up Analysis Based on Initial Findings

My analysis of RQ_2 demonstrated positive gains by both ability groups despite claims from Slavin (1987a) that student grouping only has a positive effect when it is applied to the high-ability students and that it has a negative effect on low-ability students. Based on my findings and Slavin's previous claims, I expanded the original analysis of the mean variance to two additional cohorts, control and typical-growth. The control cohort comes from the random sample of n = 55 scores from the original 2012—2013/control of n = *115* 8th grade samples from CPMS. The typical-growth cohort is based on the typical growth measure built into the NWEA-MAP test. According to the NWEA-MAP database, a typical student should improve by four NWEA-MAP score points within a single school year (+4, NWEA-MAP).

With the additional two cohorts, I ran an additional one-way ANOVA and a post-hoc Tukey HSD test based on the significant result. Table 11 shows the one-way ANOVA results of the mean variance between the four cohorts where the F value of 3.697 is associated with the probability value of p = .013. Given the necessary threshold of p = .05, the null hypothesis of no difference between the groups was rejected. Table 12 shows the Tukey HSD test of the four cohorts where significant difference exists between the high-ability cohort and the control cohort (p = .023), and between the high-ability cohort and the typical-growth cohort (p = .030). There is no significant difference between the low-ability and any of the three other cohorts (low-ability/high-ability, low-ability/control, and low-ability/typical-growth).

Table 11

One-way ANOVA for Math Growth: Low-Ability, High-Ability, Control, and Typical Growth Cohorts

	Sum of squares	*df*	Mean square	*F*	Sig.
Between groups	385.214	3	128.405	3.697	.013
Within groups	7502.836	216	34.735		
Total	7888.050	219			

Table 12

Tukey HSD Post Hoc Test for Low-Ability, High-Ability, Control, and Typical-Growth Cohorts

(I) Cohort types		Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
Low-ability	High-ability	-1.54545	1.12388	0.516	-4.4553	1.3644
	Control	1.69091	1.12388	0.437	-1.219	4.6008
	Typical-growth	1.58182	1.12388	0.496	-1.3281	4.4917
High-ability	Low-ability	1.54545	1.12388	0.516	-1.3644	4.4553
	Control	3.23636*	1.12388	0.023	0.3265	6.1462
	Typical-growth	3.12727*	1.12388	0.03	0.2174	6.0372
Control	Low-ability	-1.69091	1.12388	0.437	-4.6008	1.219
	High-ability	-3.23636*	1.12388	0.023	-6.1462	-0.3265
	Typical-growth	-0.10909	1.12388	1	-3.019	2.8008
Typical-growth	Low-ability	-1.58182	1.12388	0.496	-4.4917	1.3281
	High-ability	-3.12727*	1.12388	0.03	-6.0372	-0.2174
	Control	0.10909	1.12388	1	-2.8008	3.019

*. The mean difference is significant at the 0.05 level.

Discussion: How student grouping impacted the two grouped cohorts.

Given the results of no significant difference between the effect of ability grouping of the high and low cohorts, it is important to note the effect that the student grouping had on the raw NWEA-MAP scores of the students. Table 13 captures the raw NWEA-MAP point score breakdown of the two cohorts at the points of the pretest and posttest administration of the NWEA-MAP assessments (Pretest: $M_{low} = 211.53$, $SD = 11.001$, $M_{high} = 232.97$, $SD = 8.411$; Posttest: $M_{low} = 217.11$, $SD = 10.638$, $M_{high} = 240.09$, $SD = 11.872$). Figure 6 shows a scattered distribution of the student scores from the Low-Ability cohort in the fall of 2013 (pretest) that does not follow the normal distribution curve drawn over the histogram. However, the end of the year (posttest) histogram of the raw NWEA-MAP scores of the Low-Ability cohort shows a more streamlined distribution, with the bulk of the scores around the middle of the score range (Figure 8). On the other hand, Figures 7 and 9 demonstrate that the student grouping impacted the High-Ability group in a way that moved the entire distribution by roughly 10 NWEA-MAP score points to the right. As such, the most noticeable effect that the student grouping had on the High-Ability cohorts is most prevalent in the increase of roughly +20 NWEA-MAP score points in the far right extremes.

Table 13

NWEA-MAP Score Breakdown for Low-Ability and High-Ability Cohorts

Cohort type	Raw NWEA-MAP mean score Fall	Std. deviation	Raw NWEA-MAP mean score Spring	Std. deviation	*N*
Low-Ability	211.53	11.001	217.11	10.638	55
High-Ability	232.97	8.411	240.09	11.872	64

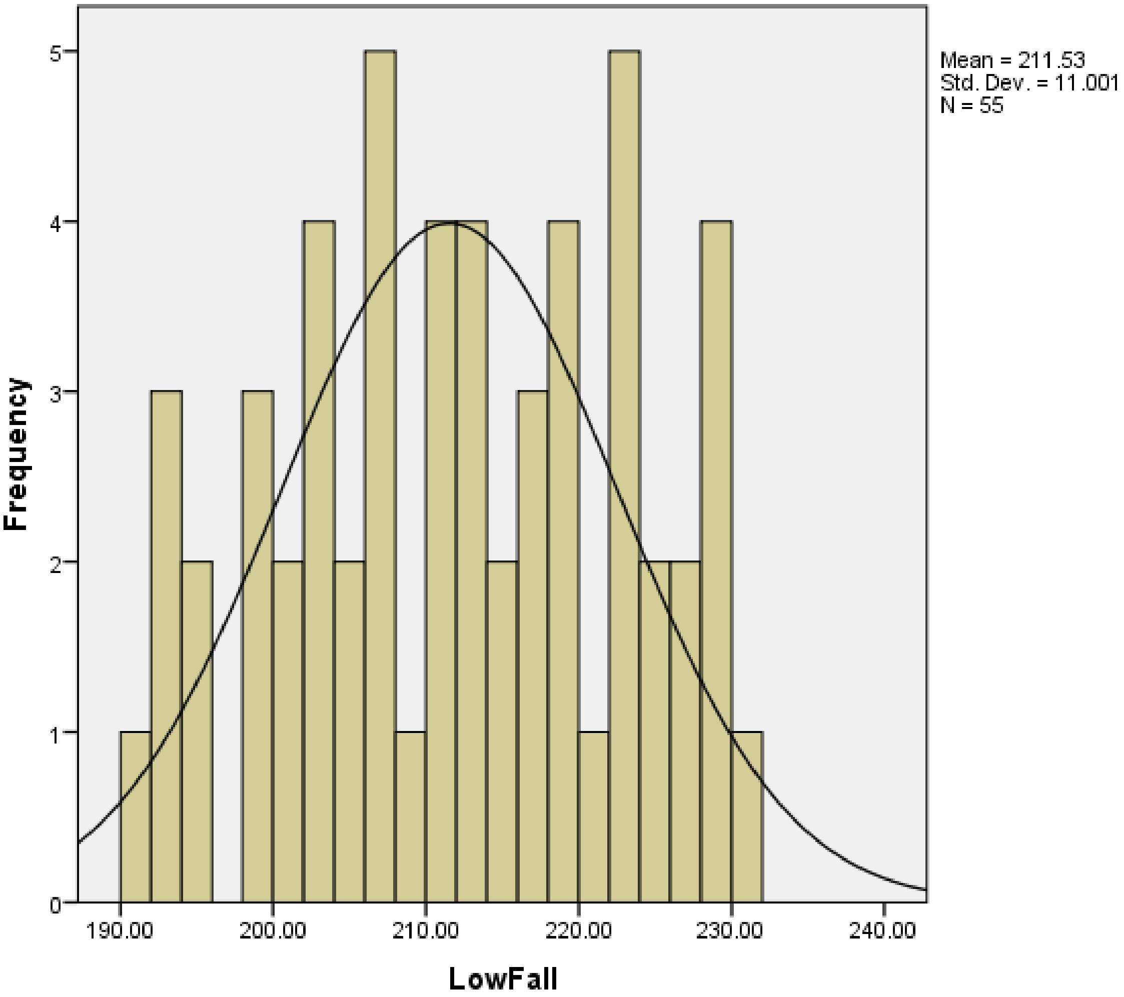

Figure 6. NWEA-MAP scores of the low ability cohort, Fall 2013

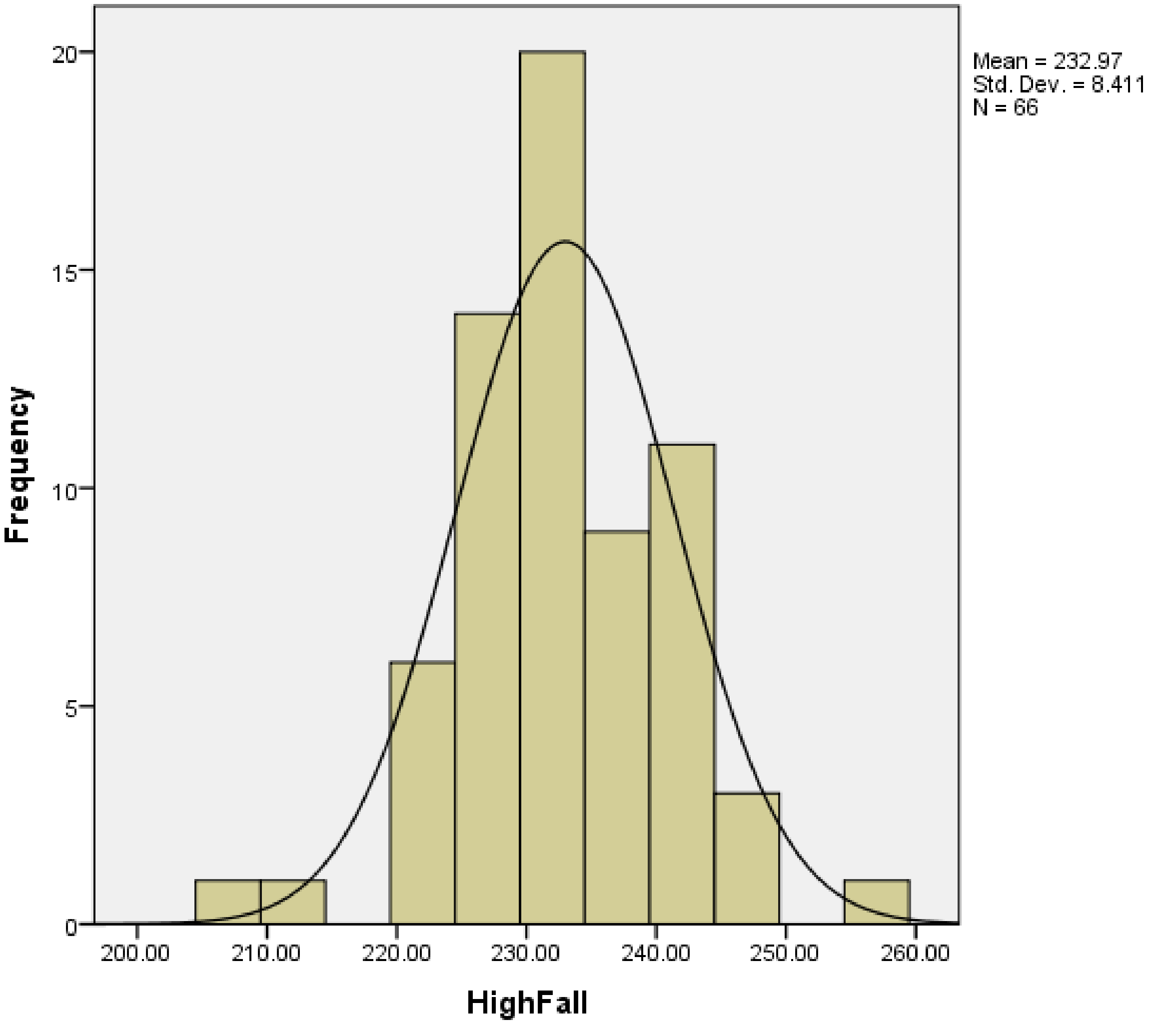

Figure 7. NWEA Scores of the high ability cohort, Fall 2013

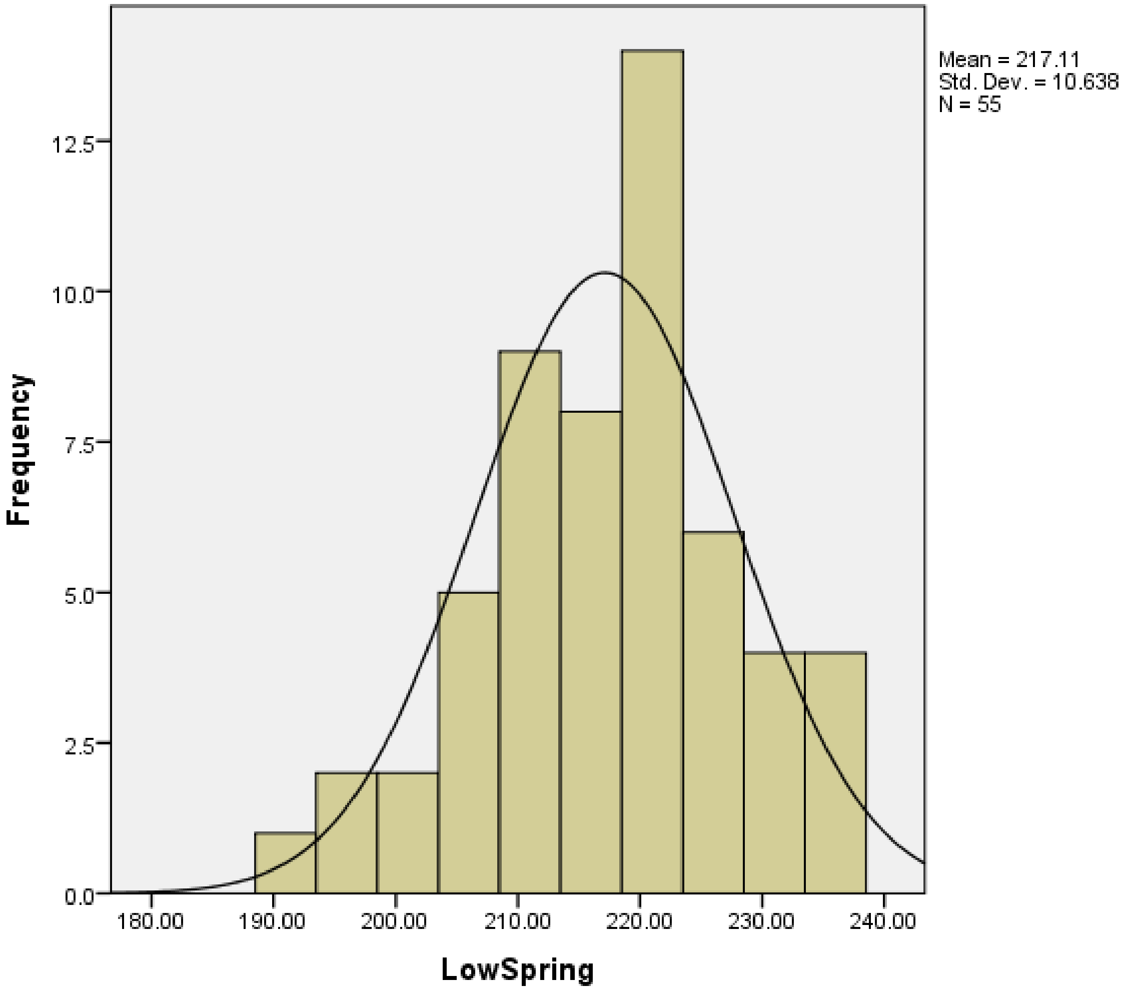

Figure 8. NWEA-MAP scores of the low ability cohort, Spring 2014

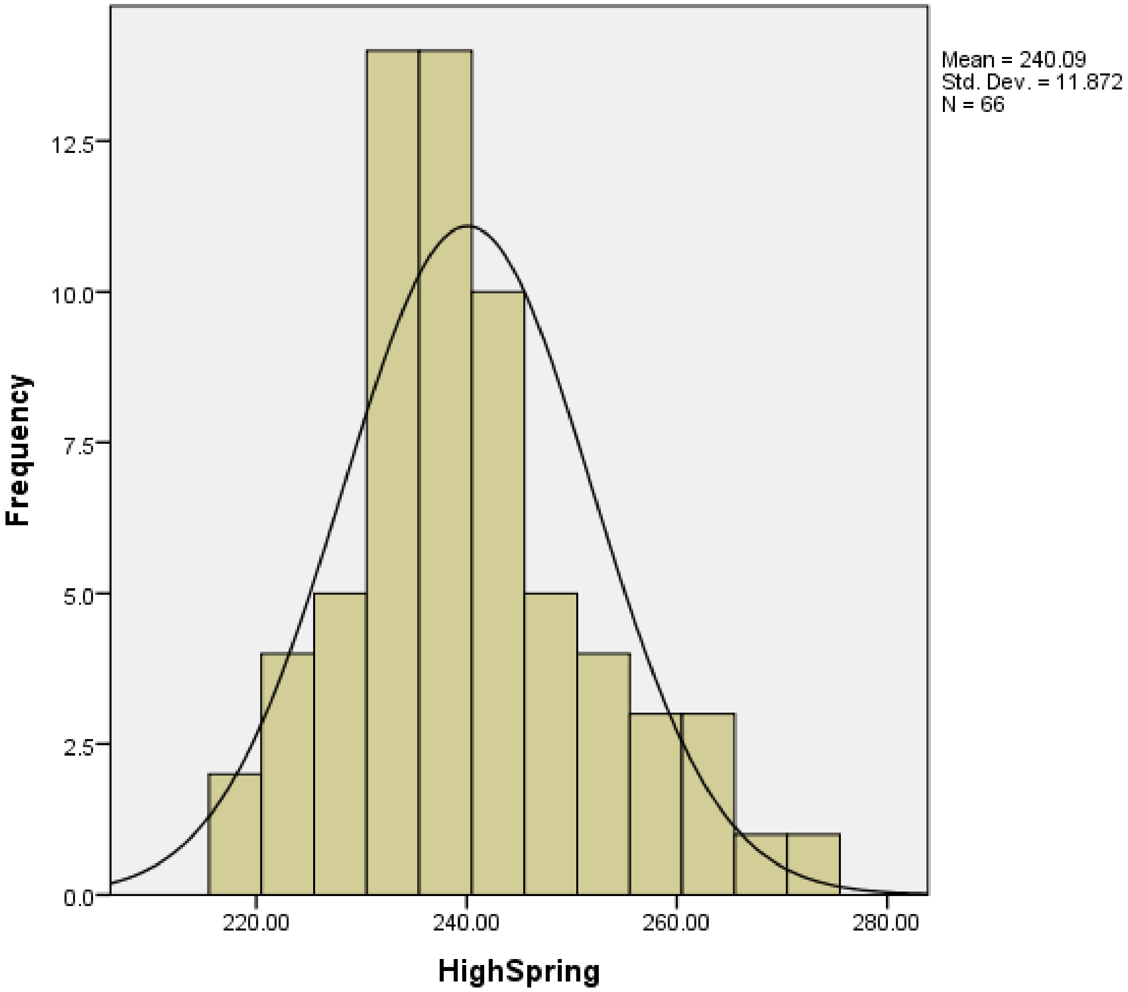

Figure 9. NWEA-MAP scores of the high ability cohort, Spring 2014

According to the Tukey HSD homogeneous subsets of means in Table 13, the high-ability cohort is significantly different from the control and typical-growth cohorts, while the low-ability cohort belongs both to the homogeneous subset of control and typical growth as well as the homogeneous subset with the high ability cohort. This two-fold subset homogeneity of the low-ability is most evident in Figure 10. Whereas the mean scores of the control and typical-growth cohorts clearly rest on the bottom end of the diagram, the low-ability cohort's mathematics growth mean of $M = 5.58$ lies exactly in between the high-ability cohort's growth mean of $M_{high} = 7.12$ and those of the control $M_{control} = 3.89$ and the typical-growth $M_{typical} = 4.00$. While the student grouping allowed the high-ability students to almost double the typical mathematics growth within a single school year, it is important to notice that the student grouping also allowed the low-ability students to increase their academic achievement by almost 50% more than when they received their instruction in the nongrouped cohorts.

Table 14

Homogeneous Subsets: Low-Ability, High-Ability, Control, and Typical-Growth Cohorts

Tukey HSD[a]

		Subset for alpha = 0.05	
LowHigh	*N*	1	2
Control	55	3.8909	
Typical-growth	55	4.0000	
Low-ability	55	5.5818	5.5818
High-ability	55		7.1273
Sig.		.437	.516

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 55.000.

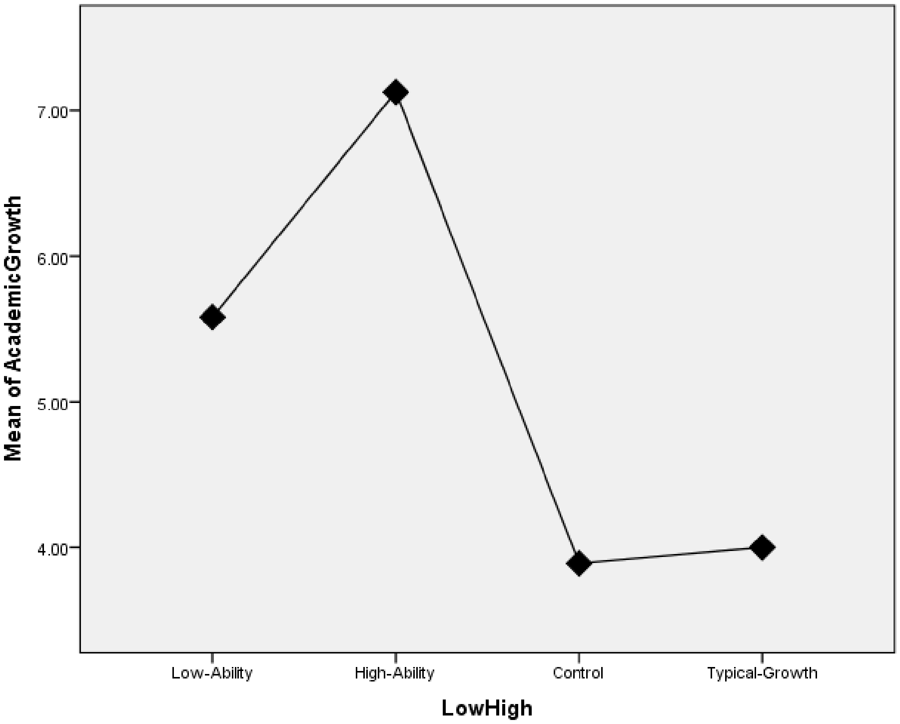

Figure 10. Means plots: M_{low} = 5.58, M_{high} = 7.13, $M_{control}$ = 3.89, $M_{typical}$ = 4.00

Data Analysis Summary

This quantitative study focused on the quantitative outcomes of the student grouping as an instructional intervention in an inner-city middle school. The study used the archival ex post facto assessment scores from the two cohorts of students, *n = 115* students in the nongrouped, control cohort of 2012—2013, and *n* = 119 students in the grouped, treated, cohort of 2013—2014 school year (*N* = 234). To adjust for the disproportionate number of students in two cohorts, the study used randomly generated numbers to eliminate the excess data and create comparable samples of *n = 115* students. As an instrument, the study used standardized NWEA-MAP assessments that provide longitudinal data from the beginning and the end of each school year to create the dependent continuous variable, academic achievement. To calculate the academic achievement of each student, the study first matched up each of the encoded scores from the fall (pretest) and the spring (posttest); then second, used the difference in the NWEA-MAP point score spring-fall to create the single academic achievement score. With categorical independent variables of student grouping, the study used one-way ANOVA to test the mean variance between the control and treated cohorts.

ANOVA analysis of the mean variance between the control (nongrouped) and the treated (grouped) cohorts demonstrated their statistically significant difference of $p = .013$. To gage the direction of the difference between the two cohorts, I created a third cohort, typical-growth $n = 115$, based on the +4 annual increase of the student achievement within a school year that is built into the NWEA-MAP assessment. In the post-ANOVA analysis, Tukey HSD, only treated (grouped) cohort demonstrated statistical significance relative to the control and the typical-growth cohorts. Control cohort on the other hand almost entirely mirrored the achievement of the typical-growth cohort ($M_{treated} = 6.48$, $M_{control} = 4.24$, and $M_{typical} = 4.00$). To explore more effective instructional itnervention for closing of the achievement gap, this study was able to demonstrate that student grouping accoring to their ability and skill level has the capacity to expedite the academic achievement of the students.

To examine the scope of academic improvement and achievement in mathematics within the treated cohort, I analyzed the mathematics scores of the students in the low-ability and high-ability cohorts. Due to the partial data and the lack of one of the pretest-posttest scores, this study was able to examine $n = 55$ of the low-ability, and $n = 64$ of the high-ability students. To adjust for the sample size, I used SPSS's random number generator to eliminate nine score values from the high-ability cohort and adjust both groups to $n = 55$. Even though the high-ability cohort improved on average by $M_{high} = 7.13$ relative to the low-ability cohort's $M_{low} = 5.58$ NWEA-MAP point scores, this difference in the achievement is not statistically significant with $p = .24$.

To gage a deeper understanding of the academic achievement of the students from the two cohorts, the study created additional two cohorts from the original 2012—2013 control (randomly chosen $n = 55$, $M_{control} = 3.89$) and the typical-growth cohort based on the mathematics growth of +4 points built into the NWEA-MAP assessment ($n = 55$, $M_{typcial} = 4.00$). In the post hoc analysis, Tukey HSD test captured homogeneity that the low-ability cohort falls in between the two homogeneous subsets. With its $M_{low} = 5.58$, low-ability is grouped into homogeneous subsets with the control and typical growth cohorts on the one hand, and with the high-ability cohort on the other hand. As such, while the low-ability cohort did not show the significant difference from the high-ability cohort, it is clear that both of the grouped cohorts, high and low, demonstrate greater levels of mathematics growth than their control (nongrouped CPMS) and typical-growth counterparts.

Consequently, findings from this study serve as a platform for a position paper that deals with the ways mandated programs of intervention and Title I funding can transform into programs that have the capacity to close the achievement gap. This study offers quantitative data that substantiate student grouping as a means of bettering the educational opportunities and solutions in our inner-city environment. Finally, this study opens the door to many qualitative studies that can examine the psychological, mental, emotional, and meta-cognitive dimensions of the student grouping in inner-city environments, and the way they affect students' sense of self-efficacy.

Section 3: The Project

Description and Goals of Project Study

Under the umbrella of the NCLB Act and its vision of the universal proficiency of all students in the United States in 2014, this doctoral project study examined the effect of student grouping, as an instructional practice used in the affluent suburbs, on student achievement in an urban setting (McCoach, Gubbins, Foreman, Rubenstein, & Rambo-Hernandez, 2014; Patrick, 2013; Shaunessy-Dedrick, Evans, Ferron, & Lindo, 2015; Spencer, 2012). The project employed an ex post facto quasi-experimental design to look at the quantitative outcomes on standardized assessments of the student grouping that took place in an urban, 100% African American, charter school. The main goals of the project were to (a) examine the effect of tiered instruction that is available in affluent, primarily White, suburban environments on the annual mathematics growth level of the minority, low-SES students; and, (b) to examine the level of academic achievement between the high- and low-ability cohorts, relative to each other and relative to the nongrouped control cohort. Similar to other studies (Brulles & Winebrenner, 2013; Matthews, Ritchotte, & McBee, 2013; McCoach et al., 2014; Shaunessy-Dedrick et al., 2015; Sparks, 2013), findings from this study confirmed that programs of instructional intervention through student grouping allowed for a greater level of academic gains within a single school year.

To gage the level of academic improvement of the students from one urban middle school in the study, I used the longitudinal, standardized assessment data from the NWEA-MAP from the beginning and the end of the school year. In 2012–2013/control, eighth-grade students at this school attended their mathematics classes in heterogeneous, nongrouped classrooms that are typical feature of urban school districts (Hartney & Flavin, 2014; Patrick, 2013; Perna, May, Yee, Ransom, Rodriguez, & Fester, 2015; Rogers-Chapman, 2013). In 2013–2014, eighth-grade students from the same school attended their mathematics classes in either low- or high-ability classes, modeled by the honors, advanced placement, or International Baccalaureate Diploma Programme available in affluent school districts (Erwin & Worrell, 2012; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Perna et al., 2015). By subtracting the pretest (fall score) from the posttest (spring score) in each school year, I created a continuous dependent variable, mathematics growth. Using the one-way ANOVA test of variance using an SPSS computer program, I found that when urban students are not grouped according to their level of ability in mathematics, they achieve at the typical growth rate ($M_{control} = 4.24$, $M_{typical} = 4.00$). On the other hand, when the same urban students are grouped according to their level of ability in mathematics, they exceed their nongrouped and typical growth rate by 60% ($M_{grouped} = 6.48$). In other words, for every typical 1-year mathematics growth of the nongrouped students, the students from the ability-grouped cohorts improved by an average of 1.6 years in mathematics growth. With regard to the second research question of the difference in the achievement of student in high- and low-ability cohorts, despite the difference in the mean rate of improvement of the two cohorts ($M_{high} = 7.12$, $M_{low} = 5.58$), this difference did not meet the necessary statistical significance.

In summary, this project study was deployed as a means of quantifying the effect of instructional practices that are typical for affluent environments on the student achievement in an urban setting. This project compiles quantitative evidence in favor of student grouping as a potential solution for the achievement gap between the high- and low-SES students from the racial majorities and minorities respectively. This project study serves as the foundation for a policy recommendation that positions student grouping and at the epicenter of the debate of closing the achievement gap and the policy frameworks of the NCLB, Race to the Top, and all future reforms in education.

Rationale

In light of the NCLB’s failure to meet its own 2014 deadline for universal proficiency of all students, and the new “Blueprint for Reform” that recognizes that most of the students who struggle to achieve the mandated standards of proficiency live in communities that are incapable of addressing the range of their needs, this project provides an alternative to generic and abstract Title I programs (Pinder, 2013; Rebell, 2012; Rogers-Chapman, 2013). Given arguments against student grouping that place racial minorities and low-SES backgrounds at the center of negative outcomes of such educational practices, this particular project examines the effect of student grouping exclusively on the achievement of racial minorities from low-SES backgrounds. By looking at the effect of student grouping outside of the White, high-SES suburbs, this project has the capacity to provide quantitative evidence and substantiate the efforts for civil rights and equal opportunities for all children.

In the era of the demographically precise student achievement data of post-NCLB America, a quantitative project like the one described here uses the same mandated, standardized, and CCSS-based assessments to examine the effectiveness of the instructional practices from the high-performing schools in the traditionally underperforming, urban settings. By employing the concept of tiered instruction, this project serves as a foundation for an important discourse that recognizes the modern segregation along the ZIP code lines as our reality. It is not the absence of talent in urban environments that prevents racial minority, low-SES students from achieving; it is the systemic denial of opportunities and dual standards that protect the status quo in our society (Boykin & Noguera, 2011; Erickson, 2011; Hartney & Flavin, 2014; Hillard, 2003; Reardon, 2011).

This project provides quantitative evidence of ways that the achievement gap between the high- and low-SES students can close when the schools use research-derived instructional practices with proven results. Whether segregation in our schools is de jure or de facto; whether our classes are high-ability and low-ability, or honors, AP, or at the grade-level, it is the interconnectedness of the educational opportunities and achievement that make the problem of the underperforming urban schools a political issue (Patrick, 2013; Perna et al., 2015). This project substantiates the need of urban schools for a competitive academic program that is available in affluent schools; the one that encompasses the curricular and instructional solutions beyond Title I programs of special education and bilingual services (Delpit, 1995; Ogbu, 2003; O'Malley, Roseboro, & Hunt, 2012; McUsic, 2004; Weis, 1988). As the opportunities for gifted and talented programs favor those who already enjoy the most privileged careers and educational prospects (high-SES, racial majorities), it is crucial to bring advanced curricula to the urban environments and enable talent from all ZIP codes, SES backgrounds, and skin pigmentation to fulfill its potential.

Review of Literature

Analysis of Research and Theory about Project Genre

This doctoral project study is designed and deployed to gather quantitative evidence of the application of instructional intervention programs typical to affluent school districts, like tiered curricula and student grouping, in the traditionally underachieving environments of inner-city schools. The outcome of this urban student-grouping study is a position paper that offers a new context for the debate of the achievement gap between students from the low- and high-SES environments. To contextualize this study within a large body of scholarship, I researched using terms such as *achievement gap*, *student-grouping, heterogeneous and homogeneous classrooms, advanced curricula*, *Title I funding, NCLB, segregation*, *desegregation*, *resegregation*, *school of choice, inner-city schools*, *urban schools, SES background*, and *tiered classes*. I researched these terms from ERIC, Education and Policy: a SAGE full-text database, Education Research Complete, and ProQuest Central databases located in the Walden University Library.

Policy papers represent a “scholarly avenue for communicating opinions, guidance and recommendations of a group or organization based on evidence-based findings, expert opinion, and best practices” relevant to the domain of research (Barrocas et al., 2010; Trainor, Lindstrom, Simon-Burroughs, Martin, & Sorrels, 2008). This particular position paper provides a critical context for the debate of equitable education as it relates to the dual standards of de jure desegregation through policies, and de facto resegregation by choice. The position paper also provides guidance for practitioners and leaders in education, civil rights activists, and all local and national stakeholders interested in the ways different instructional practices can help reduce the academic achievement gap in American education (Barrocas et al., 2010; Trainor et al., 2008). Through the multi leveled connection between various types of research, this paper provides an additional link to future research in education policy, psychology, and social systems related to effective strategies in education.

This project study rests upon a small-scale research about the effectiveness of a given program of instructional intervention in an isolated urban school district, but its purpose is not evaluative. This project study is not sponsored by the given school district, even though its findings are shared with the district. Rather, this project study represents an attempt of quantitatively examining the interplay between the instructional and curricular practices such as student grouping, typically enforced in affluent, high-achieving environments, and their effectiveness in the traditionally low-achieving, urban environments. The findings of the study serve to substantiate the argument that connects opportunities in education with the “interlocking system of oppression” (Hill-Collins, 1990, p. 225).

Educational, Political, and Social Context for Project Study

As the U.S. educational landscape embraced the concept of desegregation and equal rights to opportunities in the late 1960s, the following decade of the 1970s expanded the idea of limitless opportunities to the way schools provided instruction to their students across racial, ethnic, and SES denominations. The idea of tracking students as a means of catering to their individual needs became the embodiment of the same negative and repressive ideas of civil liberties (Worthy, 2010). As a result, U.S. schools embraced the idea of heterogeneous classrooms, full of diverse and diversified learners, where differentiated instruction would, at least theoretically, empower all students with the mastery of the standardized learning expectations (Kalogrides & Loeb, 2013; Pierce, Cassady, Adams, Speirs Neumeister, Dixon, & Cross, 2011; Worthy, 2010). In the wake of desegregation and heterogeneous learning environments, members of the relatively wealthy White urbanites relocated to the suburbs where their tax funds and choice schooling engendered the new kid of segregation: segregation by choice and economic might (Boykin & Noguera, 2011; Denvir, 2014; Erickson, 2011; Hartney & Flavin, 2014; Matthews et al., 2013; Perna et al., 2015; Pinder, 2013; Rebell, 2012). As the suburbs became wealthier and whiter, the concept of heterogeneous classrooms opened the door to tiered instruction of grade-level, honors, advanced placement (AP), and International Baccalaureate Diploma Programme (IBDP) courses as a direct resurrection of the hierarchical cycle of educational opportunities and prospect outcomes (Delpit, 1995; Hartney & Flavin, 2014; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; O’Malley et al., 2012; Perna et al., 2015; Reardon, 2011; Worthy, 2010). On the one hand, the system of equal opportunities championed the argument against student grouping within schools as a perpetual funnel for social injustice of the “brownier lower streams of education” that hurt students from the racial and ethnic minorities, and low-SES backgrounds (O’Neill, 1976; Rubie-Davis, 2014, p. 12). On the other hand, the same system of equal opportunities galvanized the unequal distribution of opportunities at the macro level, circumscribed by the ZIP code of school districts (Boykin & Noguera, 2011; Denvir, 2014; Erickson, 2011; Gottfried, 2014; Ispa-Landa 2013; O’Malley et al, 2012; Reardon, 2011; Rogers-Chapman, 2013; Spencer, 2012). Finally, as we laud the efforts of high-quality education for *all* children, on the wings of the NCLB or Race to the Top (RTTT) policies of the last decade, tiered learning opportunities of the honors, dual-enrollment, IBDP, and gifted programs remain the reality of the affluent, White suburbs, while the inclusive classrooms of diverse learners remain the theoretical ideal of the urban schools.

Different policies that reiterated or updated the original Elementary and Secondary Education Act of 1965 have pushed for the increased financial support for disadvantaged students (Dee & Jacob, 2011; Horn, 2015; Kress, Zechmann, & Scmitten, 2011; McLaughlin, 2010; Pinder, 2013; Rebell, 2012; Thorson & Krafft, 2014). Between the time of desegregation of the 1970s and the NCLB era of the 200s, the income-achievement gap increased by 30% to 40% (Reardon, 2011).

On the one hand, the educational policies of the 1960s and 1970s desegregated American schools and allowed for the modern policies of NCLB and RTTT to mandate uniform and standardized learning outcomes for all students (Erickson, 2011; McCoach et al., 2014; Rogers-Chapman, 2013). On the other hand, the relocation of the white, more affluent urbanites to the suburbs created a new wave of segregation that directly ties educational opportunities to the financial might of the residents of the school districts (Denvir, 2014; Hughes & North, 2012; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; O’Malley et al., 2012). The main feature of today’s educational landscape is its devotion to the status quo and the preservation of the societal hierarchies along the same racial, ethnic, and SES lines, in spite of the political façade of civil liberties and equal opportunities.

Analysis of How Research and Theory Supports Project

While the schools that serve traditionally underperforming demographics of various minorities receive billions in federal funding, those funds are directly tied to the programs that serve the students in the *standardized bubble* (Dee & Jacob, 2011; Harris, 2011). Rather than injecting those funds into structural solutions that enable students to venture into deep learning, according to their skill level and capacity through learning discourses and opportunities for advanced content, most of the funding goes to special education and bilingual programs that benefit students on the outskirts of achievement (Dee & Jacob, 2011; Dixon-Roman, 2013; McCoach et al., 2014; Spencer, 2012). Attached to the sanctioned policies of student achievement, urban schools that receive Title I funding never stand a chance of developing the curricula outside of the AYP mandates. Continuously seeking a quick fix for the few students within the standardized threshold, through *safe harbors* that make student achievement an abstract concept, most of the urban schools fail to ever deliver the promise of equitable education (Kress et al, 2011; Patrick, 2013; Rogers-Chapman, 2013).

Several miles from the urban settings and the spider web of Title I funds, suburban school districts invest significant funds from personal sources like property and income taxes, and explore various means of deep learning, beyond minimal expectations of proficiency. It is in these environments that parents demand from their school districts to provide honors, AP, or IBDP courses that easily convert into competitive advantage once their students enroll in universities. Even though the total number of schools offering the highest level of tiered courses, IBDP, has increased from 165 in 1995 to 682 in 2009, the number of Black students attending these programs did not change (Perna et al., 2015). Moreover, studies like the Ispa-Landa (2013) and the Ispa-Landa and Conwell (2015) that examined the perceptions of the urban Black students in Diversify school lottery programs in affluent school districts demonstrated that (a) all affluent schools offer different tiers of content courses, and (b) none of the participating urban students was ever placed in the high-tier classes. In spite of the negative connotation of student grouping, Sparks (2013) documented that in 2011 over 60% of teachers supported and enforced some type of ability-grouping of the students.

Finally, when the achievement gap in the traditional context of educational policies becomes neuroanatomical, simple Title I programs of remediation, special and bilingual education do not suffice the gravity of the problem. Mackey et al. (2015) measured and found that the achievement gap in the traditional sense is directly tied to the volume of the cortical grey-matter of the students. In their sample, students from the high-SES background not only had higher scores on standardized tests, but they exhibited greater cortical thickness in all lobes of the brain (Mackey et al., 2015). Outside of the circumstantial influences of stress and malnutrition that contribute to the neurological development of the low-SES students, it is the quality of educational programs that enhance electrophysiological and cognitive functions of the children (Mackey et al., 2015). It is, consequently, not a matter of the level of talent or desire of the children to learn, but it is the scope of educational opportunities that ramify as high- and low-achieving prospects of all students (Harris, 2011; Mackey et al., 2015).

The quantitative project study that is the basis of the attached position paper (see Appendix A) demonstrated that when the traditionally underachieving urban students received instruction in heterogeneous classrooms, they achieved at the typical growth rate ($M_{control} = 4.24$, $M_{typical} = 4.00$). As such, they remained the same academic distance apart from their affluent, White peers since both groups would move ahead by the same number of points. When, however, the traditionally underachieving urban students received instruction in classrooms according to their level of skill, they improved at a 60% greater rate ($M_{grouped} = 6.48$). By simply applying the concept of student grouping like the tiered programs of honors, AP, or IBDP courses, this project study suggests one potential answer to the question of what could happen if the high level interventions were used in lower level environments in American education.

Consistent with the recent studies that looked at the effect of various degrees of students grouping on the level of student achievement, this project study provides the foundation for important political discourses (Collins & Gan, 2013; Marks, 2014; Matthews et al., 2013; McCoach et al., 2014; Pinder, 2013; Shaunessy-Dedrick et al., 2015). De facto student grouping, weather by the mere zip code of a student district or by the school-wide course offerings, has already defeated the idea of de jure desegregation. More importantly, in spite of the language of equalizing policies, de facto grouping of the students remains the catalyst for the societal hierarchies and income-achievement gaps. At the point where (a) policies quantify achievement within sanctioned funds of Title I programs; (b) where the zip code dictates the scope and the quality of education that the students may receive; (c) where the choice of the wealthy ensures the preservation of the current hierarchies; and, (d) where the social circumstances shape physiological capacity of the people, it is crucial to provide evidence about the underlying causes and not the outcomes of the income-achievement gap.

Implementation

Resources, Supports, and Barriers

This doctoral project study rests upon the instructional solutions in one inner-city school districts that took place in 2013—2014 when the researcher served as the lead teacher for the mathematics department at the given school. Prior to grouping of the 8th grade students, this school district used the SpringBoard textbooks and the curricula as it provided the vertical alignment of the instruction throughout the district (College Board, 2011). In the years prior to student grouping, the district implemented Algebra I as a universal curriculum for the 8th grade mathematics classes. This instructional solution rested upon the idea of exposing the students to the ninth-grade curriculum early on, regardless of their ultimate mastery levels, so that when the same students moved on to high school, they would be more successful. Given the existing partnership with the College Board, implementation of the student grouping program only required reorganization of the existing resources.

To employ a two-tiered curriculum of the 8th grade mathematics courses, I established several solutions (Borko et al., 2003; Love, 2009; Schlechty, 2009). First, I worked with the mathematics teachers from the school to group the rising 8th graders into the low- or high-ability cohorts by using their seventh grade Spring 2013 NWEA-MAP scores. Second, I mustered the necessary support from the school administration and leadership to reallocate the SpringBoard resources. As such, the four low-ability cohorts would utilize the 8th grade Common Core State Standards, CCSS-based, SpringBoard textbooks while the four high-ability cohorts would utilize the Algebra I CCSS-based SpringBoard textbooks (College Board, 2011). Finally, I provided the scope and sequence buttressed in the mandated CCSS to ensure consistent curricular and instructional implementation across the grouped cohorts. The necessary longitudinal NWEA-MAP assessments were already in place. Keeping the student body demographically consistent—students in the control and the grouped cohorts remained the same age, 100% African American, and from low-SES background—the study was able to compare the academic achievement of the 8th grade students from 2012—2013/control and 2013—2014/treated. Given this qualitative consistency of the two samples of students, the only treatment of this quasi-experiment was the instructional grouping of the students.

Timetable, Roles and Responsibilities of Student and Others

Due to the personal and professional involvement of the researcher with the school district and the students from the 2013—2014 cohorts, this project was only possible as an ex post facto study. Since the graduation of the 2013—2014 student cohorts, the researcher transitioned to a new role at a different school district, and the NWEA-MAP scores of the control and the treated cohorts became archival records of the researched school district. Within the framework of a quantitative ex post facto quasi-experiment, this project study provides a safe opportunity to examine the effect of student grouping on standardized student achievement without any repercussions, threats, or breaches of the wellbeing of the students. In addition to signing the necessary Letter of Cooperation and the Data Use Agreement, the data-providing school district removed all identifiable information from the datasets. The data-providing district used randomly generated numbers to sort students according to their grouping assignment. All of the data in this project study are purged from all personal information in regards to any participating student or teacher.

Upon the conclusion of the 2013—2014 school year, the researched school district modified the original high/low student-grouping model in 8th grade mathematics to a new cluster-grouping model of low/medium and low/high learning cohorts across contents. Additionally, the school district also dropped the College Board curricula and established a new partnership with the program called “Expeditiary Learning.” Upon the conclusion of this doctoral project study, I will provide a copy of the research summary to the data-providing district. I will provide the original school district with an informative outlook on the successfulness of the student grouping program that took place in 2013—2014. I intend to assist the school district in finding the best curricula and instructional solutions for the upcoming school years.

Project Evaluation

Type of Evaluation

This project study rests upon a quantitative ex post facto quasi-experimental design. In spite of the aggregate comparison of the two cohorts of students relative to their instructional grouping at a specific school, the nature of this project is not evaluative. Rather, the quasi-experimental component of this project study serves to quantify the effect of student-grouping on the levels of academic achievement of the inner-city students. As an outcomes-based summative study that used one-way ANOVA to compare mean variance between two cohorts of students, this project already has the built-in evaluative dimension. By quantifying the level of academic improvement within each of the two school years, 2012—2013/control and 2013—2014/treated, this project study was able to place a number value to the aggregate level of academic achievement of the students from the study.

On the other hand, this project study provides a position paper that is intended to propose student-grouping as one of the potential solutions to the problem of the achievement gap in the American education (Howley, 2012; Schultz, 2014). Beyond the environment of the school district where the research study took place, this doctoral project study provides an argument for the systemic institutionalization of the societal hierarchies and allocation of resources and opportunities. As a position paper, this project study serves as a platform for advocacy on behalf of the inner-city students, inner-city communities, and inner-city educators who necessitate evidence about the learning capacities of the students on the one side, and the inequitable learning opportunities for those students on the other. Finally, thorough evaluation of the effectiveness of this position paper requires time beyond the timeframe of this doctoral project study. Once the findings of this study are complete, and the doctoral project completes the necessary due process of draft and reviews, the researcher will share these findings with the educational and political leaders and stakeholders. The ultimate success of the project study would ramify through the application of the student-grouping programs and the increased academic achievement by the inner-city students.

Overall Goals and Stakeholders

The overall goals of this position paper were to contribute to the efforts of closing of the achievement gap. Rather than looking at the subjective and qualitative perceptions of the achievement gap, this position paper only looks at the quantitative outcomes of student grouping based on ability as an instructional intervention from the affluent and high-performing school districts in a traditionally underachieving environment of an inner-city school. It is the goal of this doctoral project study and its culminating position paper to inform the school leaders from the researched school district, public officials in Detroit, Michigan, and the U.S., and the nonprofit organizations and activists that seek solutions to the problem of inner-city education. At the moment when organizations like Teach for America and other alternative efforts of closing the achievement gap necessitate quantitative evidence of the learning capacity of the inner-city students, this study can ignite many important conversations at the local and the national level. In spite of its small scale and its limited scope, this quantitative project study should invite a more robust, large-scale research examining the interplay between the educational solutions from the high-performing school environments and their application in the traditionally low-performing school environments.

Local and Far-Reaching Implications for Social Change

In 2013—2014 school year, students from urban school districts that serve predominantly low-SES, minority demographics tested at the 29.4% proficiency levels, and the 18.8 ACT composite score (Michigan Department of Education). Just under 20 miles down the road, nonminority students from affluent environments achieved at the 70.9% proficiency levels, and the 26.1 ACT composite score (Michigan School Data, 2015). During the same year, only CPMS offered Algebra I to its 8th grade students as their mathematics curriculum, whereas the pre requirement for the acceptance to the highest ranked high school in Michigan and ninth overall nationally is mastered content from Algebra I and Geometry, ninth- and tenth-grade CCSS curricula, respectively (Michigan School Data). Locked inside the heterogeneous classrooms of low proficiency levels, very few students from inner-city schools would ever have an opportunity to enroll into such high-performing schools.

When the students in heterogeneous classrooms achieve only at the typical growth rate ($M_{control}$ = 4.24, $M_{typical}$ = 4.00), and those who attend tiered classes achieve at a 60% greater rate ($M_{grouped}$ = 6.48), it is important to consider student grouping as a potential strategy for the closing of the achievement gap. Given the great absence of the minority students in the gifted and talented courses, as well as the STEM careers, projects like this one demonstrate that the minority students do not lack talent, but rather lack educational opportunities (Erickson, 2011; Erwin & Worrell, 2012; Gottfried, 2014; Mackey et al., 2015; Matthers et al., 2013; Perna et al., 2015; Pinder, 2013; Worthy, 2010). The greatest impact of this study is not in its creation of some novice concepts in education. Rather, the greatest impact of this study is its application of the existing successful practices of the high-SES, high-performing school environments in a traditionally low-SES, low-performing inner-city school. As such, the most impactful outcome of this project study is the quantitative evidence of the learning capacity of the inner-city students, and the practical solution to the logistical, organizational, and circumstantial deadlock of inner-city schools.

When researchers like Ispa-Landa (2013) and Ispa-Landa and Conwell (2015) document the availability of the tired curricula in the most affluent school of today; or the teams of researchers like the ones at Massachusetts Institute of Technology, Mackey et al. (2015), quantify the relationship between the SES and the students' neuroanatomical formations, studies like this one must alert our policy-makers, community leaders, parents, and students about the dangerous outcomes of the current de facto segregation in American education. By placing the inner-city, minority students into heterogeneous classrooms, NCLB-framed schools not only ensure the income-achievement gap of today, but permanently alter the learning potential of an entire population. Because of the findings like the ones described in this project study, local and national activists and educational leaders must recognize that the achievement gap stems from the systemic orchestration of the learning opportunities and not the innate lack of interest, talent, or intelligence of inner-city children.

Conclusion

This doctoral project study and its encompassing position paper rest upon four pillars of scholarship. First, the Attewell and Domina (2008) National Educational

Longitudinal Study (NELS) study that identified students' SES as the greatest predictor of their curricular intensity and further educational outcomes. Second, the quantitative meta-analysis by Kulik and Kulik (1992) that stated that only substantial curricular adjustments have the capacity to produce substantial academic gains in students. Third, the *2008 Brown Center Report on American Education* that found that each additional track of mathematics curriculum increased the number of advanced students in a given school by 3% (Loveless, 2009). And fourth, recent scholarship of interlocking systems of oppression that identify different forms of income-achievement gap as a direct outcome of de facto school resegregation (Dee & Jacob, 2011; Denvir, 2014; Dixon-Roman, 2013; Gottfried, 2014; Hughes & North, 2012; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Mackey et al., 2015; McCoach et al., 2014; McUsic, 2004; O'Malley et al., 2012; Perna et al., 2015; Pinder, 2013; Reardon, 2011; Rebell, 2012; Spencer, 2012; Worthy, 2010). Upon these four pillars, this doctoral project study employed an ex post facto quasi-experiment to measure the effect of instructional practices from the high-performing, high-SES school districts (i.e. student grouping) on the overall academic gains of the traditionally underperforming minority, low-SES students.

In spite of the arguments against student grouping that state how such instructional practices ultimately hurt minority students from low-SES backgrounds, this doctoral project study proved that student grouping in exclusively minority and low-SES schools only accelerates the achievement of the students (Rubie-Davis, 2014; Slavin 1978, 1981, 1987, 1990). For every typical growth rate of the heterogeneous, nongrouped cohorts of students, grouped cohorts achieved at a 60% higher rate ($M_{grouped} = 6.48$,

$M_{control}$ = 4.24, $M_{typical}$ = 4.00). Consistent with the concept of tired curricula of grade-level, honors, AP, or IBDP courses, simple delineation of high- and low-ability cohorts enabled the participating students to achieve at a higher aggregate rate (Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Matthews et al., 2013; Perna et al., 2015; Worthy, 2010). Given the Attewell and Domina's (2008) findings of the relationship between the SES and the type of the curricula that are available in schools, it is plausible to think that the Title I efforts under the NCLB programs only serve to preserve the societal hierarchy (Beecher & Sweeny, 2008; Boykin & Noguera, 2011; Delpit, 1995; Erwin & Worrell, 2012; Hughes & North, 2012; Pinder, 2013; Reardon, 2011; Shaunessy-Dedrick et al., 2015; Spencer, 2012).

When inner-city students, as diverse learners, attended classes in heterogeneous classrooms at CPMS, they performed at the typical growth rate. Regardless of their skill level, both high- and low-ability students improved by the mean score that is almost identical to the growth score built into the standardized instrument ($M_{control}$ = 4.24, $M_{typical}$ = 4.00). However, when the CPMS students attended their classes grouped according to their skill level, both tiers of students outscored their own counterparts from the heterogeneous classrooms (M_{high} = 7.12, M_{low} = 5.58). In other words, low-ability CPMS students improved on average by 1.34 NWEA-MAP points more than when they attended classes with their high-ability peers. Conversely, when high-ability CPMS students attended classes in homogeneous classrooms, they improved on average by 2.88 NWEA-MAP points more than when they attended heterogeneous classrooms.

Section 4: Reflections and Conclusions

Project Strengths

The greatest strength of this doctoral project study was in the archival nature of the student assessment data. With the longitudinal data from both school years, 2012–2013/control and 2013–2014/treated, which were available through the data provider, I used an ex post facto quasi-experiment to measure the effect of student grouping without having any immediate or long-term consequences for the participating students and teachers. Moreover, the randomization of the student data that the data provider encoded prior to sharing the data with the researcher makes the entire study replicable, and the findings are valid and reliable. The categorical independent variables were classified as control and treated, as well as high and low. The continuous dependent variables were the pretest and posttest NWEA-MAP scores. This dataset allowed for a clean rerun of a one-way ANOVA test of mean variance of any two subsets of the data. For the purpose of this quantitative project study, I used SPSS software and found that the CPMS students who attended their mathematics courses according to their skill levels achieved at a greater rate than when they were placed into heterogeneous classrooms. Moreover, I found that even though the students from the high-ability cohort improved more than the students in the low-ability cohort, both sets of grouped cohorts have enabled students to improve more than when they were placed into the same classrooms. The raw, encoded data are available in Appendix B.

Recommendations for Remediation of Limitations

The greatest limitation in the project's ability to address the problem of academic achievement in inner-city classrooms comes from the qualitative aspect of the student grouping that took place at CPMS. Aside from physically separating the students into groups based on their standardized assessment scores, the school did not implement consistent curriculum across the cohorts. Consequently, it is unclear whether the positive effect of student grouping came from the differentiated instruction or from the behavioral classroom dynamics. Any future study of student grouping in inner-city classrooms would benefit by ensuring curricular and instructional consistency across the groups.

Given its quantitative ex post facto nature, this study did not examine any qualitative aspects of the student grouping. Consequently, a mixed-methods study that looks at the quantitative aspects of grouping (e.g., assessment scores) along with the student perceptions of the grouping would provide a more cohesive picture of the effect of student grouping in the inner-city educational environments. Moreover, a qualitative study that looks at the long-term effect that the student grouping has on the students' perceptions of self as a scholar and a professional would most certainly address the concerns of the scholarship that sees student grouping as a negative concept. Finally, the post NCLB scholarship in education necessitates a longitudinal panel study that would look at the cumulative effect of students grouping in inner-city environments. Considering the disproportionately low conversion of high-school graduation to college graduation of inner-city students, a longitudinal panel study would contextualize all small-scale, annual grouping interventions in terms of the big picture of the achievement gap.

Scholarship

While I lived out my project study long before it became my doctoral project research, I realized its magnitude only when I began to contextualize it in terms of the existing scholarship. Aside from the intangible sense of faith that any researcher has going into their research, it is through the continuous, cyclical search for the peer-reviewed evidence from the past studies that the intangible becomes the contributing. As each research study advances from the guiding question and the problem statement, through the hypotheses and the research questions, to the methodology and the data analysis, so the researcher expands their own understanding of the problem. It is through this arduous forging of the scholarship that each scholar makes their individual contribution to the existing body of knowledge. In the end, the very completion of a given body of research solidifies the notion of learning as a process, not a destination.

Project Development and Evaluation

This project study was gradually developed over the course of my doctoral studies. The actual grouping of the students at CPMS took place concurrently with my graduate work, as it was logistically available and possible given my role of a lead mathematics teacher at CPMS, my understanding of the student grouping as an instructional intervention required continuous refining through the learning modules of the doctoral courses. It was my daily interaction with the student grouping at CPMS that motivated me to explore the problem of student grouping through the multiplicity of doctoral courses; even when the learning outcomes of the course did not matchup with my research interest. By the time I had to develop my prospectus, I have already accumulated a vast body of scholarship that shaped the final course of the project study.

One main feature of the project development was the project necessity for the ex post facto data analysis. Given my professional involvement with the place of the research and the students who represented the sample for the research, it was crucial to ensure all precautionary measures pertaining to the wellbeing of the students and all participating teachers at CPMS. In that effort, the project had to take place a year after the students from the 2013—2014 cohort graduated from CPMS, when their assessment data became archival. Even though the project study did not require personal interaction with any of the participants, to ensure the protection of the rights of the participants the data provider removed all identifiable information from the datasets. As such, all of the data from this project study are encoded and de-identified, and available for any future reruns of the analyses.

Leadership and Change

In the effort to improve the educational outcomes in inner-city environments, it is important to understand the difference between the leadership that aspires to sustain and the leadership that aspires to disrupt the existing social systems (Schlechty, 2009). To seek solutions to the current educational paralysis of an achievement means disruption of the existing social systems (Christensen, 1997). However, disruption alone is not the solution in and of itself. Rather, the type of leadership that has the capacity to disrupt the current societal order and motivate a change requires thorough research and understanding of the scholarship around the given phenomenon. It requires a factual, feasible, and deliverable alternative to the existing social systems, delivered in a way that motivates support from the key stakeholders.

Leadership and change must also invite innovation and future-oriented thinking. Leadership's delivery of change rests upon collaboration and inquiry (Love, 2009). It is unlikely that any individual can deliver the change singularly. Tectonic changes that deal with social injustice like the income-achievement gap necessitate a progressive movement and the public support. It is the strength of the argument and the evidence that can tip the critical mass of public support in the direction of positive change.

Analysis of Self as Scholar

Although I always approached life with curiosity, it was through my doctoral project study that I saw the simultaneous and exponential growth of both my knowledge and of the concepts that I did not know. What was once my opinion, through research and scholarship review became factual evidence. As a result, my thoughts sought out facts and in return produced factual arguments. The notion that the arguments that I make must meet the rigor of the peer review, and the writing that I produce must meet the APA and other scholarly standards, forged me into a more efficient thinker. Through the continuous cycling of revisions, editing, and rewriting, I became a scholar that appreciates the process of self-improvement. In the end, it was always about the becoming, not the state of being a great thinker.

Analysis of Self as Practitioner

When I first thought of earning a doctoral degree, I thought of a PhD. As I became more involved with the development of the mathematics programs in inner-city schools, I realized that my passion lays in practice and immediate application and implications of my ideas. However, to make a meaningful contribution, a practitioner must equip themselves with enough knowledge to champion the change that they want to see in their environment. Over the course of my doctoral education, I learned that I need reliable sources of information in order to produce effective arguments in my own efforts of changing the educational landscape in the inner-city Detroit. While an activist can afford opinions and unofficial information, a scholar practitioner must always buttress their argument in the factual knowledge of the existing research.

As an inner-city educator of many roles, I began to advocate for a more effective instructional solution than the heterogeneous classrooms that we currently have. Student grouping as an instructional intervention came out of the necessity for a more effective daily teaching in a classroom that requires simultaneous remediation and enrichment, given the vast skill range of its learners. As a scholar practitioner, I learned that student grouping is not a novice concept, but rather a reality that is implemented in many of the high-achieving schools. Moreover, it is one of the most commonly disputed topics in education, especially in the light of the school desegregation and equitable education under the NCLB. As a practitioner, I am able to use my scholarly research to bolster my arguments and champion the campaign for an educational advancement in neediest schools. It is because of my scholarly understanding of the student grouping as an instructional intervention that I can implement such programs as a member of the turnaround team in one of the lowest performing schools.

Analysis of Self as Project Developer

Given my professional role of an inner-city educator, I was a project developer before I became a scholar practitioner. My daily interaction with the inner-city students and the community forced me to develop practical projects that would expedite the achievement of my students; often ad hoc, and often on my own. However, when I began my doctoral studies I decided to use all of my coursework to develop my understanding of the student grouping as a concept and a solution to the underachieving inner-city schools. As the courses covered different aspects of my Ed.D program, I develop the individual concepts into a cohesive mosaic of student grouping as a means of closing of the achievement gap.

Similarly to my development from an inner-city educator and an activist to a scholar practitioner, my ability to muster the necessary support from the administrators and other stakeholders to build a program in my school gave way to a systemic analysis of the existing research, scholarship, methodology, and the presentation to inform a large scale reform of the way we provide education to our inner-city students. As a result, my logistical maneuvering of the limited resources in my immediate environment became the strategic development of the pretest-posttest systems that quantify the efforts in terms of the standardized performance of the students. Within the framework of the demographically nuanced NCLB mandates, projects that produce data that link students' race, SES, and the zip code to the standardized assessments are not only scholarly, but are also socio-politically relevant and potent. Within the perimeters of the power analysis of a sample size, and the statistical significance of the findings, projects that quantify the effect of some programs have the capacity to augment the efforts for social change.

The Project's Potential Impact on Social Change

This project study offers empirical evidence of the effectiveness of student grouping as an instructional intervention in the inner-city schools. Through its quasi-experimental design, this project study demonstrated that when the traditionally underachieving, low-SES, inner-city students receive instruction in the same way as their suburban, high-SES peers, they achieve at the greater rate than when placed into heterogeneous classrooms. By conducting the study in an inner-city environment that serves only low-SES and Black students, this project directly addressed the argument of no-grouping as it hurts the students from these very demographics. Finally, the project quantifies the argument that student grouping not only accelerates the academic achievement of the inner-city students, but it does so without the negative impact on the low-ability students. Once grouped according to their skill level, inner-city students achieve more than when they attend nongrouped, heterogeneous classrooms.

Within the framework of de facto and de jure segregation, as well as the social activism of institutionalized, systemic oppression, this project study offers evidence that the current programs of supplemental intervention under the NCLB Act are impotent in their effort to close the achievement gap. Instead, all socio-political efforts to improve the opportunities in American schools must allow for the spillover of the best practices from the high-achieving schools of the suburbs, into the low-achieving schools of the inner-cities. It is not that the inner-city schools require novice or very innovative solutions like the ones that the RTTT talks about in the 2009 program summary. Student grouping as an instructional intervention has been around and producing great conversion of high school graduation into college graduation; the problem is that only those right schools of choice could afford its implementation. As such, this project study must serve as a platform for the future dialogue among the policy-makers, community leaders, and the educators from the inner-city environments. Locally, this project study offers a practical solution to the problem of the underachieving classrooms. At a low cost, and with $150 million in annual Title I funds, inner-city schools can use the standardized assessments to group their students and offer their courses based on the concept of continuous learning, rather than grade level.

Implications, Applications, and Directions for Future Research

The research questions guiding this study investigated wherein student grouping as an instructional intervention had any effect on the level of academic achievement of the inner-city students. The two sets of hypotheses contextualized the research questions in terms of the existing scholarship that identifies student grouping as a negative concept that not only fails to produce academic gains, but it also hinders the achievement of the students from the low-ability cohorts. With an ex post facto quasi-experimental design, this project study was able to measure the effectiveness of student grouping relative to the mathematics achievement of the students during the nongrouped previous school year.

Findings indicated that the inner-city students who received their instruction in mathematics in low- and high-ability cohorts, have indeed achieved 60% greater academic gains that their peers in nongrouped cohorts. These findings were statistically significant. The study also found that while the students in the high-ability cohorts achieved at a greater rate than their peers in the low-ability cohorts, this difference in the level of achievement was not statistically significant. Moreover, both cohorts of students achieved at a greater rate separately than when they attended heterogeneous, nongrouped classrooms. Considering that the nongrouped cohorts achieved at the “typical growth” rate of the 5,200 school districts that utilize the NWEA-MAP assessments, the 60% greater rate of achievement of the grouped cohorts demonstrates that student grouping does have the potential to accelerate the pace of academic achievement of the inner-city students and, hence, close the achievement gap.

This project study has a limited scope as it only provided two levels of instruction at a single school. Additionally, the levels of instruction were not consistent at each level relative to each other. As such, future research must ensure the curricular and the instructional consistency across and within the grouped cohorts. Without this consistency, it becomes unclear if the academic gains stem from the behavioral outcomes of the student separation or if the academic gains indeed require curricular and instructional levels.

Given the argument of negative impact of student grouping on the level of self-confidence, self-worth, and the sense of efficacy of the students in the low-ability cohorts, a mixed methods research that documents the qualitative aspects of student grouping at the time of grouping, during grouping, and post grouping would supplement the findings of this study. A longitudinal panel study that looks at the cumulative effect of student grouping throughout the years of school, from middle school through high school graduation, would substantiate the initial findings of this study. Moreover, such a large scale, longitudinal panel study would most certainly substantiate the efforts of various current policies, and inform the practical implementation of education reform in America.

Conclusion

As I conclude my doctoral project study, I understand the value of the continuous forging of an idea. Buttressed in the existing, peer-reviewed scholarship and research original ideas can make their contribution and motivate action. It is the duty of a researcher to continuously seek information; to explore alternative perspectives and opposing arguments. Through my doctoral project study, I learned that my idea was not necessarily novice; but the way I connected the existing practices of tiered instruction in high-SES environments and the concept of de facto desegregation and systemic injustices that shed some new light to the debate around the concept of an achievement gap. At the end of my doctoral project I realize that its closure only leads to more learning and new studies.

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Appendix A: Position Paper

Ability Grouping Interventions and Math Performance Among Inner-City School

Dates of Project:

January 2015–June 2015

Date of Report:

July 2015

Executive Summary

At a given urban charter middle school that serves the 100% African American student body, student achievement on standardized assessments in mathematics mirrors the academic underachievement of other urban environments. To improve the rate of achievement in mathematics, the school used the model of student grouping of 8th grade students and organized instruction of mathematics in two-tiered curricula. This instructional intervention was based on the common concepts of tiered instruction in the traditionally high-achieving environments that offer grade level, honors, advanced placement, and International Baccalaureate Diploma Programme courses. Executed as an ex post facto quasi-experiment with a one-way ANOVA test of mean variance, this instructional intervention compared the student achievement in mathematics between the nongrouped 2012—2013/control and the grouped 2013—2014/treated cohorts of students. The study found that the inner-city students who attended mathematics classes in grouped cohorts on average achieved at a 60% greater rate than their peers from the nongrouped cohorts. Within the grouped cohorts, students from the high ability groups achieved at a greater rate than the students from the low ability groups, but this difference was not statistically significant.

Given that the study took place in an isolated charter school, its findings require a more robust rendering. To prove the positive effect of student grouping on the level of mathematics achievement, future studies must examine the effect of student grouping across multiple locations. To ensure the complexity of the findings, future research should employ a mixed methods research design. In addition to the quantitative data that the current study found in regard to the level of achievement in mathematics, it is beneficial to gather qualitative data that examine the perceptions and subjective experience of the inner-city students within grouped environments.

Introduction

As the U.S. schools failed to deliver the NCLB promise of academic proficiency by 2014, we realized that the programs of closing of the achievement gap between the low-socioeconomic status (low-SES) and high-socioeconomic status (high-SES) students would require a new approach. In 2009, President Obama reiterated the message of providing high-quality education to all of our students and incentivized states with additional funds to develop new and creative ways of educating our neediest students (U.S. Department of Education). Even with more than $150 million in Title I funds, Detroit Public Schools (DPS) that serve the neediest inner-city students from the predominantly low-SES and minority demographics, only achieved the 29.4% proficiency and the 18.8 ACT composite score (Michigan School Data, 2015). On the other hand, suburbs just 20 miles north on I-75, without those same Title I funds achieved at the 70.9% proficiency levels, and the 26.1 ACT composite score (Michigan School Data). Given that 80% of the Detroiters are Black and over 40% live below poverty levels while the residents of the given suburbs are 99% White with less than 3% living below poverty, it is crucial to contextualize the academic achievement gaps within a larger idea called an “interlocking system of oppression” (Hill-Collins, 1990, p 225).

This position paper rests upon three bodies of research: (a) the quantitative meta-analysis of Kulik and Kulik (1992) of student grouping; (b) Attewell and Domina's (2008) longitudinal NELS study on education outcomes and students' SES background; and, (c) the 2008 Brown Center Report on American Education that links each additional tier of instruction to an increased number of advanced students (Loveless, 2009). The paper further uses an original ex post facto quasi-experimental project study of ability grouping of inner-city students in one of Detroit's charter schools to substantiate its recommendation for more effective curricular and instructional solutions for the low-achieving inner-city environments. By taking the best instructional practices from the high-achieving schools (student grouping) and applying them to one of the inner-city environments, the project study demonstrated that the underachievement of the inner-city students does not come from their lack of intelligence, but rather stems from the lack of opportunities. Finally, this position paper contextualizes the quantitative findings within the perimeters of the recent scholarship on the income-achievement gap as a systemic effort to protect the existing allocation of resources and the hierarchy in the society (Dee & Jacob, 2011; Denvir, 2014; Dixon-Roman, 2013; Gottfried, 2014; Hughes & North, 2012; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Mackey et al., 2015; McCoach et al., 2014; McUsic, 2004; O'Malley et al., 2012; Perna et al., 2015; Pinder, 2013; Reardon, 2011; Rebell, 2012; Spencer, 2012; Worthy, 2010). In short, by employing the program of student grouping as a substantial alteration of the entire curricular and instructional setup in a given inner-city school, this position paper offers a positions student grouping and leveled instruction at the nucleus of the education reform in America.

Sociopolitical Context and Background of the Achievement Gap

After the 1965 Elementary and Secondary Education Act that preceded all iterations of the current NCLB Act (2002), the American system began its school desegregation. However, that same *de jure* desegregation already in the 1970s became *de facto* resegregation (Matthews et al., 2013; Rubie-Davis, 2014). White and better-off urbanites left their urban environments for the suburbs, and began the modern era of income-segregation (Dee & Jacob, 2011; Denvir, 2014; Hartney & Flavin, 2014; Hughes & North, 2012; Marks, 2014; Pinder, 2013; Reardon, 2011). Funded by the property and income taxes of the district residents, community schools swiftly became schools of choice (Dixon-Roman, 2013; O'Malley et al., 2012). Concurrent with the idea of educational desegregation, the American education policies implemented a large-scale detracking of the students. Instead of grouping students according to their ability in homogeneous cohorts, modern education saw heterogeneous cohorts as more democratic and conducive to learning (Attewell & Domina, 2008; Loveless, 2009; Slavin, 1987a, 1987b; Worthy, 2010). As a result, the same populist idea of equity and equality that, first, mandated racial desegregation then, second, allowed for the income-resegregation of the American schools, was the idea that paved built paralyzed, heterogeneous classrooms in the inner-city schools, and the honors, AP, and IBDP classrooms in the suburban schools of choice (Erickson, 2011; Erwin & Worrell, 2012; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Kress et al., 2011; Thorson & Krafft, 2014).

Underrepresented in the gifted and talented programs and STEM careers, yet trapped in the heterogeneous classrooms where the classroom behavior serves as a scapegoat for all educational underservice, it is plausible to think that the educational system never intended to close the achievement gap (Delpit, 1995; Delpit, 2012; Marks, 2014; Phillips, 2008; Simms, 2012). By denying the best educational practices of advanced curricula and different forms of student grouping, it is logical to think of an achievement gap as a shield against the true desegregation in the society (Hartney & Flavin, 2014; Kafi, 2012; McUsic, 2004). If the racial minority and low-SES students never get a chance to experience the advantageous programs that are available to those from the racial majority and high-SES backgrounds, the cyclical reinforcement of the resource allocation remains intact (Delpit, 1995; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Olszewski-Kubilius et al., 2004). As such, when no school from an urban Detroit offers Algebra I curriculum (ninth grade CCSS) to its 8th graders, while the nationally ranked suburban high school requires all students who enter its lottery application to have mastered both Algebra I and Geometry (ninth and tenth grade CCSS respectively), hierarchical preservation becomes real and immediate.

Theoretical Framework

Most of the original research about the effectiveness of student grouping as an instructional intervention took place during the 1980s and 1990s. As such, Slavin (1978, 1981, 1987, 1990) produced some of the strongest arguments in favor of heterogeneous classrooms and against homogeneous student grouping, while Kulik and Kulik (1982, 1984, 1987, 1991, 1992) defended the student grouping as the most effective way of advancing student achievement. Out of the great work that both sides championed, it is the meta-analysis by Kulik and Kulik (1992) that offered quantitative evidence on the effectiveness of student grouping. This work soon became the foundation for the multi-tiered instruction of honors, AP, and IBDP curricula in schools that could afford such structure. By analyzing various levels of curricular adjustments that take place in multiple schools – multilevel classes, cross-grade programs, within-class grouping, enriched classes for the gifted and talented, and accelerated classes—Kulik and Kulik (1992) found that only substantial curricular adjustments produced substantial academic gains in students. Given the argument of the Slavin-camp that student grouping had a negative impact on the lower ability students, Kulik and Kulik (1992) did not find any negative effect in the lower-ability cohorts.

In 2008, Attewell and Domina completed their longitudinal panel study on the connection between the high school curriculum and the post secondary and college education outcomes. With a sample of N = 8,412 participants from the National Educational Longitudinal Study database, NELS, Attewell and Domina (2008) identified students’ SES as the sole greatest predictor of the curricular intensity and further educational outcomes. According to their findings, students from the high-SES backgrounds attended honors, AP, and IBDP courses that ultimately converted to high rates of college enrollment and graduation. On the other hand, students from low-SES backgrounds did not attend the upper-tier curricula as such classes were not available in their schools, which ultimately led to low college enrollment and graduation rates (Attewell & Domina, 2008). Similarly, the “2008 Brown Center Report on American Education” found that each additional track of mathematics curriculum increased the number of advanced students in a given school by 3% (Loveless, 2009). Accordingly, as the schools developed multiple tiers of instruction like grade-level, honors, AP, or IBDP classes, their student population elevated their achievement.

When Ispa-Landa (2013) and Ispa-Landa and Conwell (2015) completed their qualitative studies on the perceptions of race and group exclusion of the Black students who participated in a Diversity lottery program of several affluent district, they documented two main features of the American schools. First, all affluent district that participated in a Diversity program offered grade-level, honors, and AP classes. And second, all urban, Black students who attended these Diversity schools only attended the low-tiered classes (Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015). When Perna et al. (2015) conducted their study on the unequal access to rigorous high school curricula, they found that while the number of the IBDP programs increased over the last decade, the actual number of Black students attending these programs remained intact. As such, the number of high schools offering the highest-tiered, dual-enrollment IBDP curricula increased from 165 schools in 1995 to 682 in 2009 (Perna et al., 2015). Nevertheless, the number of Black students in these programs did not change in spite of the more entry points (Perna et al., 2015).

Moreover, while the No Child Left Behind Act (NCLB, 2002) provided over $12 billion in annual Title I funding to the underperforming schools across America, most of the programs and efforts were directed toward the “bubble kids” and the special education and bilingual programs (Hughes & North, 2012; O’Malley et al., 2012). Rather than developing strong curricula with tiered instruction like the ones available in the affluent district, inner-city schools continuously focus their efforts on students close to the achievement bubble, and those who can help them meet the 10% safe harbor stipulation under the adequate yearly progress (AYP; Dee & Jacob, 2011; Kress et al., 2011; Patrick, 2013). More than 13 years since the NCLB Act (2002) and over six years since the RTTT (2009), it is crucial to pose the question of the purposefulness and the intent behind the current efforts of closing of the achievement gap.

Kulik and Kulik (1992) concluded their meta-analysis stating that only substantial curricular and instructional adjustments produce meaningful improvements in the student achievement. Most of the affluent, suburban school districts do exactly that – by providing tiered instruction through honors, AP, and IBDP classes, these schools accelerate the achievement of their students and ensure their position in the hierarchical allocation of resources and opportunities in the society. On the contrary, inner-city school districts that serve traditionally underachieving students only offer minor adjustments to their offered curricula – pullout remediation or in-class assisted learning with teacher’s aids and Title I teachers. The next section describes an ex post facto quasi-experimental project study that examined the effect of student grouping as a substantial instructional intervention on the academic achievement of the students in one inner-city charter school. By applying the concept of tiered instruction like the one available in high-performing schools, the project study offered a preview of what would happen if the educational practices of the high–SES serving schools were applied in the low-SES serving environments.

Project Study: Academic Achievement and Ability-Grouping of Inner-city Students

An ex post facto quasi-experimental doctoral project study represents the quantitative nucleus of this position paper. Given the evidence from the previous research described in the previous section, this project study examines the effect of ability grouping as an instructional intervention in one inner-city charter school. Considering the lottery admission requirement at the suburban high school of Algebra I and Geometry (eighth and ninth CCSS respectively) in the middle school years, this project study examined the *what if* question of bringing the instructional practices of the high-achieving middle schools to the traditionally underachieving inner-city classrooms. To protect the interests of the school that provided an opportunity for this quasi-experiment, as well as the students who attended the school during 2012—2013/control and 2013—2014/treated school years, the school will be referred to as *College Prep Middle School*, CPMS.

CPMS Project Study

Over the years, the CPMS provided instruction in heterogeneous classrooms where the skill-range was representative of the national average for inner-city schools. As a part of this quasi-experiment, in 2013—2014, the CPMS team of mathematics teachers used the longitudinal *Northwestern Evaluation Association Measure of Academic Progress* (NWEA-MAP) assessment data from the Spring of 2013 to group the incoming class of 8th grade students into two tiered cohorts. Students from the bottom half of the NWEA-MAP score data attended their 8th grade mathematics course as a part of the low-ability cohorts, while the students from top half of the NWEA-MAP score data attended their 8th grade mathematics course as a part of the high-ability cohorts. The low-ability cohorts received their instruction based on the 8th grade CCSS-based curriculum, while the high-ability cohorts followed the Algebra I (ninth grade CCSS) curriculum. There were four low-ability and four high-ability cohorts. To measure the effect of student grouping on their academic achievement, the project study used the 2012—2013 student achievement scores as a part of the nongrouped control.

Given the longitudinal data of NWEA-MAP assessments that provide three sets of student achievement data for each school year (Fall, Winter, and Spring), the study created a continuous dependent variable *mathematics growth* as a difference between each student's Spring (pretest) and Fall (posttest) scores. NWEA-MAP assessments are computer-based, individual, performance assessments that adapt to the individual performance of each student. NWEA-MAP scores stem from a vertically equated *Rasch Continuum of Knowledge* (RIT) scale that allows for the comparison across different ages and grade levels. The two independent variables were the types of student cohorts, nongrouped/control and grouped/treated. To measure the effect of student grouping on the level of the mathematics growth, the study employed a one-way ANOVA test of mean variance.

This project study focused on two research questions:

RQ_1—Is there a difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the nongrouped and ability-grouped 8th grade inner-city students and the typical growth value built into the NWEA-MAP assessment?

RQ_2—Is there a difference in the level of academic achievement in mathematics measured by the longitudinal NWEA-MAP test between the two groups of the ability-grouped 8th grade inner-city students and the typical growth value built into the NWEA-MAP assessment?

Sample and Protection of Participants' Rights

This project study took place a year after the 2013—2014 class of students graduated from CPMS. As such, all of the student achievement data are archival. To ensure the protection of the wellbeing of the students and the teaching staff at CPMS, the CPMS Central Office removed all identifiable information pertaining to the identity of the students and the teachers from CPMS during both of the school years. The CPMS Central Office used randomly generated numbers and codes in place of the actual student IDs, and listed cohorts as *C* or *T*, *High* or *Low* in place of the information pertaining to the identity of the teachers of each cohort. Only the CPMS Central Office has the raw assessment data. The researcher received and analyzed only the encoded and de-identified data.

After cleaning up the data from the samples that did not have one of the two assessment scores, pretest or the posttest, the control sample had $n = 115$ and the treated had $n = 119$ pretest-posttest samples. Within the treated/grouped cohort, the sample contained $n = 55$ low-ability and $n = 64$ high-ability pretest-posttest samples. To ensure the comparable sample size between the cohorts, the researcher used randomly generated numbers to remove the excessive data from the treated cohort, and the high-ability cohort. As such, to compare the effect of student grouping on the mathematics growth of the students, both control and the treated cohort had a sample of $n = 115$ (RQ_1). To compare the effect of student grouping on the achievement within the grouped cohort, each of the two cohorts, high- and low-ability, had a sample of $n = 55$ (RQ_2).

Findings and Data Analysis

Consistent with the original Kulik and Kulik (1992) meta-analysis, students who attended their mathematics classes in the low-ability or high-ability cohorts achieved greater mathematics growth than the students in heterogeneous classrooms ($M_{treated} = 6.48$, $SD = 6.99$, $M_{control} = 4.24$, SD = 6.62). The F ratio, calculated as the mean square between groups divided by the mean square within groups is 6.24 and it is associated with a p value of .013. Given the necessary significance threshold of .05, I rejected the Null Hypothesis and found that there was a significant effect of student grouping on their academic achievement (Table A1). According to the results in the Table A2, for each

4.2435 NWEA-MAP point score improvement by a student in the control cohort, a student from the treated cohort improved by 6.4870 NWEA-MAP points.

Table A1

One-way ANOVA for Mathematics growth between Control and Treated Cohorts

	Sum of squares	*df*	Mean square	*F*	Sig.
Between groups	289.409	1	289.409	6.243	.013
Within groups	10569.913	228	46.359		
Total	10859.322	229			

Table A2

Descriptive Statistics of Control and Treated Cohorts

		N	Mean	Std. deviation*	Std. error	95% confidence interval for mean		Minimum	Maximum	Between-component variance
						Lower bound	Upper bound			
Control		115	4.2435	6.61815	0.61715	3.0209	5.466	-13	22	
Treated		115	6.487	6.99419	0.65221	5.1949	7.779	-9	25	
Total		230	5.3652	6.88626	0.45407	4.4705	6.2599	-13	25	
Model	Fixed effects			6.80876	0.44896	4.4806	6.2499			
	Random effects				1.12174	-8.8878	19.6183			2.11347

*Given the spectrum of achievement levels from -13.00 to 25.00, large values of standard deviations do not mean that the mean variance is insignificant. Large values of standard deviations are rather associated with large scale of NWEA-MAP score points, and scattered values of individual student scores.

Also consistent with the original Kulik and Kulik (1992) meta-analysis, the difference in the level of mathematics growth between the students in high- and low-ability cohorts was not statistically significant (M_{high} = 7.13, *SD* = 6.93; M_{low} = 5.58, *SD* = 6.73). Although different, the variance between the means of the two-cohorts is not statistically significant (*F* = 1.41, *p* = .24). In other words, these findings refute the argument that student grouping has a negative effect on the students in the low-ability cohorts. Table A3 documents the one-way ANOVA test results, and Table A4 describes the statistical breakdown of the two cohorts.

Table A3

One-way ANOVA for Mathematics growth between Low-Ability and High-Ability Cohorts

	Sum of squares	*df*	Mean *S*quare	*F*	Sig.
Between groups	65.682	1	65.682	1.407	0.238
Within groups	5041.491	108	46.68		
Total	5107.173	109			

Table A4

Descriptive Statistics for Low-Ability and High-Ability Cohorts

		N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum	Between-component variance
						Lower bound	Upper bound			
Low-ability		55	5.5818	6.7294	0.90739	3.7626	7.401	-8	20	
High-ability		55	7.1273	6.93369	0.93494	5.2528	9.0017	-9	25	
Total		110	6.3545	6.84506	0.65265	5.061	7.6481	-9	25	
Model	Fixed effects			6.83231	0.65144	5.0633	7.6458			
	Random effects				0.77273	-3.4639	16.173			0.34548

Discussion: CPMS Student Grouping and Income-Achievement Gap

Even though the preceding section answered the two research questions, it is important to position these findings in terms of a big picture. According to the NWEA website, over 5,200 school districts in America utilize their MAP assessments. Based on the aggregate performance of the entire pool of students from all 5,200 school districts, the NWEA-MAP assessment instrument generated a typical growth expectation that an average student should achieve within a single school year (+4 NWEA-MAP points between the pretest in the Fall and the posttest in the Spring). Table A5 describes the statistical breakdown of the control and the treated cohorts relative to the typical growth constant. Table A6 documents the one-way ANOVA findings of the mean variance between the two grouped cohorts and the nongrouped cohort and the typical growth value, where the *F* value of 3.697 is associated with the probability value of *p* = .013. Given the necessary p value of .05, these four cohorts differ at a statically significant level. And table A7 illustrates the post hoc Tukey HSD comparison of the academic achievement of the low- and high-ability cohorts relative to the academic achievement of the control and the typical growth samples.

Table A5

Descriptive Statistics for Control, Treated, and Typical-growth Cohorts

		N	Mean	Std. deviation	Std. error	95% confidence interval for mean		Minimum	Maximum	Between-component variance
						Lower bound	Upper bound			
Control		115	4.2435	6.61815	0.61715	3.0209	5.466	-13	22	
Treated		115	6.487	6.99419	0.65221	5.1949	7.779	-9	25	
Typical-growth		115	4	0	0	4	4	4	4	
Total		345	4.9101	5.65537	0.30447	4.3113	5.509	-13	25	
Model	Fixed Effects			5.55933	0.2993	4.3214	5.4989			
	Random Effects				0.79153	1.5045	8.3158			1.61082

Table A6

One-way ANOVA for Math Growth: Low-Ability, High-Ability, Control, and Typical Growth Cohorts

	Sum of squares	*df*	Mean square	*F*	Sig.
Between groups	385.214	3	128.405	3.697	.013
Within groups	7502.836	216	34.735		
Total	7888.050	219			

Table A7

Tukey HSD Post Hoc Test: Low-Ability, High-Ability, Control, and Typical-Growth Cohorts

(I) Cohort types		Mean difference (I-J)	Std. error	Sig.	95% confidence interval	
					Lower bound	Upper bound
Low-ability	High-ability	-1.54545	1.12388	0.516	-4.4553	1.3644
	Control	***1.69091***	1.12388	0.437	-1.219	4.6008
	Typical-growth	1.58182	1.12388	0.496	-1.3281	4.4917
High-ability	Low-ability	1.54545	1.12388	0.516	-1.3644	4.4553
	Control	***3.23636****	1.12388	0.023	0.3265	6.1462
	Typical-growth	3.12727*	1.12388	0.03	0.2174	6.0372
Control	Low-ability	-1.69091	1.12388	0.437	-4.6008	1.219
	High-ability	-3.23636*	1.12388	0.023	-6.1462	-0.3265
	Typical-growth	-0.10909	1.12388	1	-3.019	2.8008
Typical-growth	Low-ability	-1.58182	1.12388	0.496	-4.4917	1.3281
	High-ability	-3.12727*	1.12388	0.03	-6.0372	-0.2174
	Typical-growth	0.10909	1.12388	1	-2.8008	3.019

*The mean difference is significant at the 0.05 level.

According to the data from Table A5, heterogeneous classrooms in inner-city schools only prepare their students at the rate of a typical growth. As such, if all students from the 5,200 school districts that use NWEA-MAP assessments on average improve by +4 NWEA-MAP points, the +4.24 NWEA-MAP point improvement of the nongrouped CPMS students neither closes the achievement gap nor does it threaten the current allocation of resources and opportunities. On the other hand, Table A6 shows a very important evidence of the effectiveness of student grouping specifically in the inner-city environments. When the low-ability students receive their instruction in heterogeneous classrooms, alongside their high-ability peers, they improve at the +4.24 NWEA-MAP point rate. However, when they receive instruction in the ability-grouped classrooms, they improve at the +5.58 NWEA-MAP point rate. When the high-ability students receive their instruction in heterogeneous classrooms, they also improve at the +4.24 NWEA-MAP point pace. But when the high-ability students receive their instruction in the ability-grouped classrooms, they improve at the +7.13 NWEA-MAP point rate. And while the two grouped cohorts improved at different rates, they each improved more when they were separated in their respective ability-level cohorts then when they were mixed together.

This positive effect of student grouping in inner-city classrooms is even more obvious in the score distribution of the cohorts. Figure A1 shows the pretest (Control Fall) and the posttest (Control Spring) distribution of the student scores in the grouped cohort. Figure A2 shows the pretest (Treated Fall) and the posttest (Treated Spring) distribution of the student scores in the grouped cohort. Table A8 shows the specific details of the effect that the student grouping had relative to the grouped and the nongrouped cohorts.

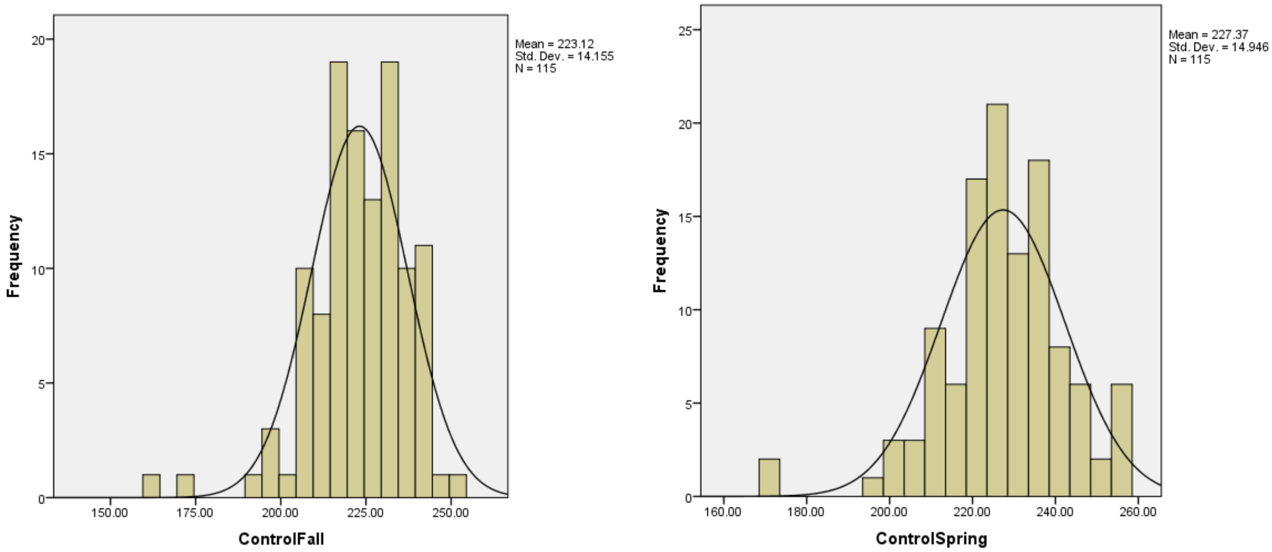

Figure A1. NWEA-MAP scores of the control cohort, Fall 2012 and Spring 2013.

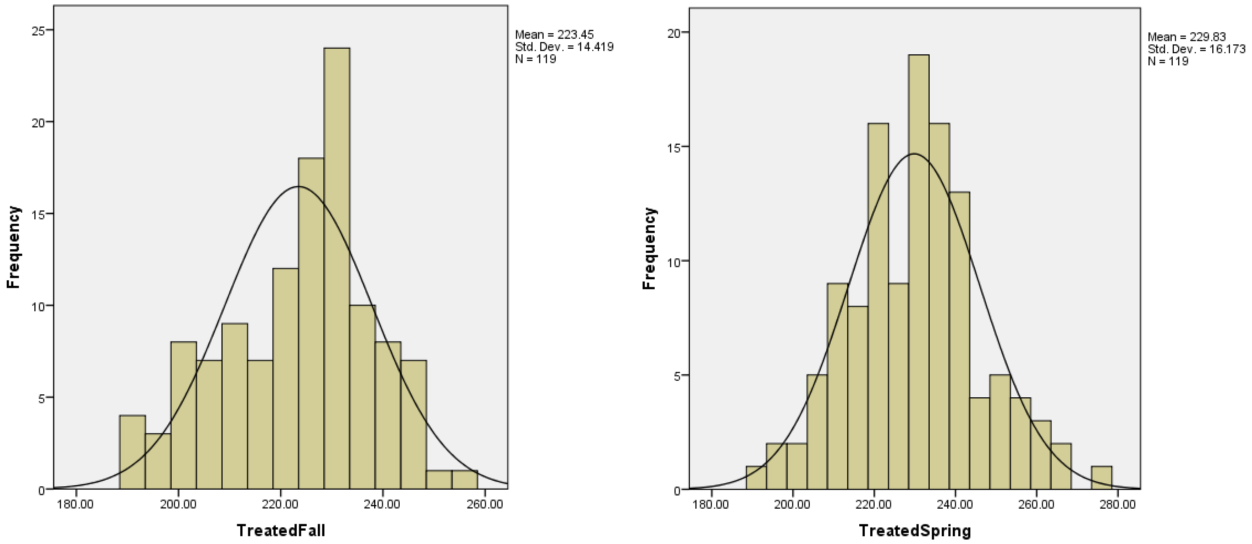

Figure A2. NWEA-MAP scores of the treated cohort, Fall 2013 and Spring 2014.

Table A8

NWEA-MAP Score Breakdown for Control and Treated Cohorts

Cohort type	Raw NWEA-MAP mean score Fall	Std. deviation	Raw NWEA-MAP mean score Spring	Std. deviation	*N*
Control	223.12	14.155	227.37	14.946	115
Treated	223.45	14.419	229.83	16.173	119

In terms of the raw score distribution within the grouped cohort, Figure A3 shows the pretest (Low Fall) and the posttest (Low Spring) score distribution of the low-ability cohorts, while Figure A4 shows the pretest (High Fall) and the posttest (High Spring) score distribution of the high-ability cohorts.

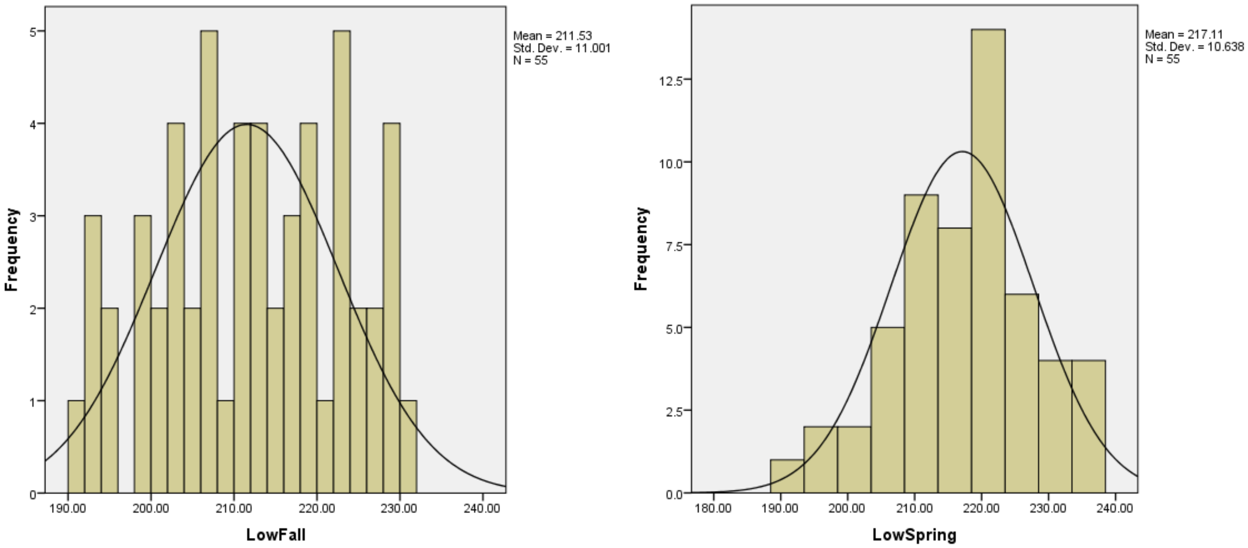

Figure A3. NWEA-MAP scores of the low ability cohort, Fall 2013 and Spring 2014.

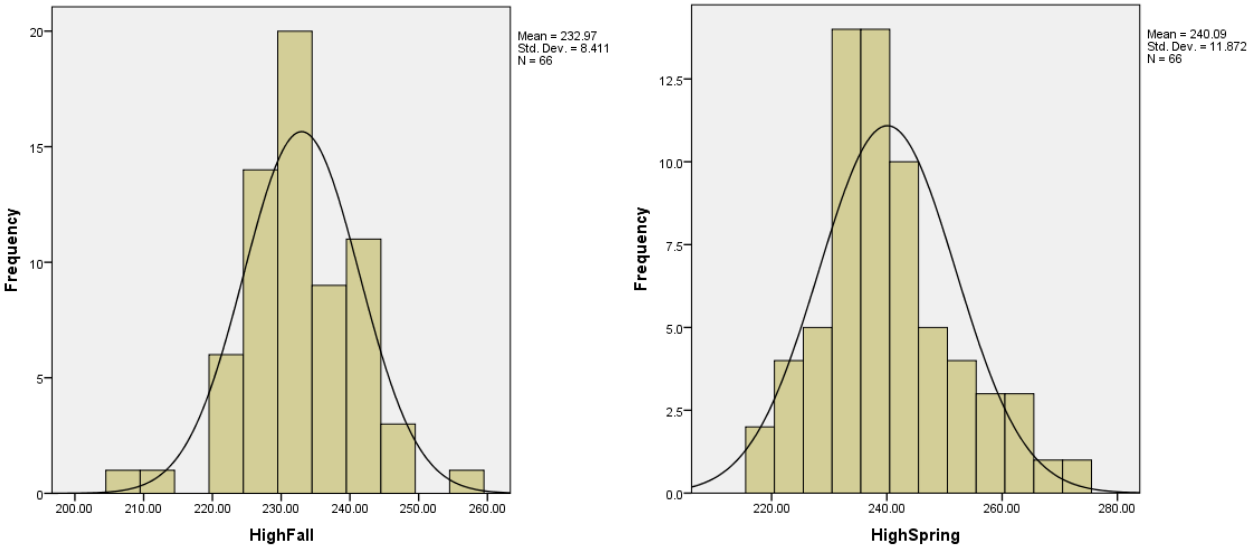

Figure A4. NWEA-Scores of the high ability cohort, Fall 2013 and Spring 2014.

Given the distribution of the raw student scores from both cohorts, it is noticeable that student grouping had a twofold effect on the low-ability cohort. On the one hand, student-grouping moved the entire low-ability cohort by +5.58 NWEA-MAP points to the right; on the other hand, student grouping brought the scattered pretest NWEA-MAP scores under the normal distribution bell-curve. This effect is particularly important given the reduction of the number of extremely low student scores and the accumulation of the bulk of the scores at the middle of the distribution. Consistent with the 2008 Brown Center Report on American Education that stated that each additional tier of instruction increases the number of advanced students by 3%, high-ability cohort enabled ten students to test at the gifted-talented portion of the curve.

Conclusion and Recommendations

In spite of the argument that student grouping makes the lower ability levels disproportionately “browner,” at the macro level of the school zip codes, that very disadvantageous browner grouping already took place (Attewell & Domina, 2008; Barela, 2008; Delpit, 1995; Denvir, 2014; Erickson, 2011; Ispa-Landa, 2013; Ispa-Landa & Conwell, 2015; Olszewski-Kubilius et al., 2004; Phillips, 2008; Rebell, 2012; Riegle-Crumb & Grodsky, 2010; Rubie-Davis, 2014; Worthy, 2010). As a result, students from the inner-city, low-SES, and minority demographics rarely enter the programs of advanced and gifted programs, which ultimately hinder their enrollment and graduation from colleges (Attewell & Domina, 2008; Erwin & Worrell, 2012; Loveless, 2009; Marks, 2014; Perna et al., 2015; Pinder, 2013). This systematic cycle of selective opportunities between those available in the high- and low-income communities is even more severe given the neuroanatomical repercussion of the entire dichotomy. Earlier this year, Mackey et al. (2015) found that the income-achievement gap is not only a matter of social justice, but rather the one with deep physiological and neurological consequences. According to this study, students from the high-income group not only outperformed their low-income peers on standardized assessments, but the high-income students also had a greater volume of the cortical gray-matter (Mackey et al., 2015). Consequently, it is not just that the underperforming inner-city schools do not provide the competitive curricula; rather, educational programs can permanently alter the neuroanatomical circuits that support cognitive abilities of the entire population (Mackey et al., 2015).

Over the recent years, several studies tested the effect of student grouping on the level of academic achievement of the students in various school environments. And while they differ in the scope and the timing of the student improvement, most of the studies recorded positive effect of student grouping (Brulles & Winebrenner, 2011; Matthews et al., 2013; McCoach et al., 2014; Shaunessy-Dedrick et al., 2015; Sparks, 2013; Worthy, 2010). Nevertheless, tiered instruction of multiple levels of rigor and differentiation only take place in affluent areas. Advanced curricula programs like IBPT have expanded by 600% over the last 15 years. Still, their implementation in inner-city schools remained low (Perna et al., 2015).

In the absence of advanced and tired curricula, inner-city schools developed the system of standardized “bubble” education. Rather than providing rigorous curricula and instruction to all of their students, inner-city schools focus their efforts on the students within the bubble of the standardized AYP threshold, and the students in need of special and bilingual education (Dee & Jacob, 2011; Spencer, 2012). Given that the special provisions of the 10% safe harbor rule allow schools to bypass the mandated performance targets of the student subgroups (racial minorities, bilingual students, IEP, etc.), it is important to question if the billions of Title I funding ameliorate or aggravate the income-achievement gap (Patrick, 2013; Pinder, 2013; Rebell, 2012).

Specifically, if (a) the Title I funds only sanction those remedial programs that target the needs of the students at the lowest level of achievement in the already low-achieving schools; if (b) the improvement of those students in the achievement bubble still remains in the lowest performing stratus; and, if (c) the system does not incentivize the achievement of the inner-city students who test above-average and advanced, then the very NCLB system is the most aggressive form of segregation, injustice, and social oppression. When the students in the nongrouped CPMS cohorts improved at the typical growth rate, their improvement did not change the societal hierarchies since everyone in the system of 5,200 school districts that use the NWEA-MAP assessments have improved by the same number of points. However, when the same students attended their instruction within appropriately grouped cohorts, they improved at a 60% greater rate than the nongrouped and the typical growth cohorts.

Consistent with the studies of tiered instruction, the CPMS study demonstrated that inner-city students can achieve greater academic gains in mathematics when they receive instruction within grouped cohorts (Attewell & Domina, 2008; Brulles & Winebrenner, 2011; Gottfried, 2014; Loveless, 2009; Matthews et al., 2013; McCoach et al., 2014; Shaunessy-Dedrick et al., 2015; Worthy, 2010). In spite of its positive effect, student grouping in CPMS is not a novice concept. Rather, it is an application of the existing programs of instructional intervention that are available in the high-income environments (e.g. honors, AP, IBDP). It is the substantial change in the curriculum and instruction that Kulik and Kulik (1992) identified as the only way of making greater academic gains in the classrooms. As such, all efforts within the NCLB Act (2002) and the RTTT (2009) frameworks must ensure that the programs that they provide actually have the capacity to make an improvement. Over 13 years since the NCLB Act and its Title I funds that sanctioned the supplementary programs within heterogeneous classrooms in inner-city schools, we ought to try an alternative.

Appendix B

Encoded, Deidentified NWEA-MAP Dataset

Grade	Section	Student ID	Term name	Discipline	Duration	Test score	TestStderror	Test %	Typical growth
8	Control	C40	Fall 2012	Mathematics	44	225	3.1	38	4
8	Control	C90	Fall 2012	Mathematics	64	232	3	54	4
8	Control	C18	Fall 2012	Mathematics	31	219	2.9	26	4
8	Control	C48	Fall 2012	Mathematics	48	235	2.9	61	4
8	Control	C45	Fall 2012	Mathematics	45	219	3	26	4
8	Control	C62	Fall 2012	Mathematics	54	239	3	70	4
8	Control	C12	Fall 2012	Mathematics	71	243	3	77	4
8	Control	C114	Fall 2012	Mathematics	49	205	3	7	4
8	Control	C128	Fall 2012	Mathematics	38	218	3	24	4
8	Control	C34	Fall 2012	Mathematics	58	219	3	26	4
8	Control	C44	Fall 2012	Mathematics	51	218	3.1	24	4
8	Control	C111	Fall 2012	Mathematics	35	215	3.1	19	4
8	Control	C73	Fall 2012	Mathematics	60	224	3	36	4
8	Control	C71	Fall 2012	Mathematics	87	238	2.9	68	4
8	Control	C91	Fall 2012	Mathematics	21	191	3.2	1	4
8	Control	C35	Fall 2012	Mathematics	87	234	2.9	59	4
8	Control	C27	Fall 2012	Mathematics	38	220	3	27	4
8	Control	C59	Fall 2012	Mathematics	61	231	3.1	52	4
8	Control	C108	Fall 2012	Mathematics	22	216	3	20	4
8	Control	C53	Fall 2012	Mathematics	21	207	2.9	9	4
8	Control	C97	Fall 2012	Mathematics	59	230	3.1	50	4
8	Control	C38	Fall 2012	Mathematics	51	210	3	12	4
8	Control	C60	Fall 2012	Mathematics	59	224	3	36	4
8	Control	C120	Fall 2012	Mathematics	50	243	3	77	4
8	Control	C47	Fall 2012	Mathematics	60	211	3	13	4
8	Control	C55	Fall 2012	Mathematics	32	240	3	72	4
8	Control	C88	Fall 2012	Mathematics	102	230	3	50	4
8	Control	C100	Fall 2012	Mathematics	66	227	2.9	43	4
8	Control	C31	Fall 2012	Mathematics	65	220	3.2	27	4
8	Control	C17	Fall 2012	Mathematics	52	209	3.2	11	4
8	Control	C21	Fall 2012	Mathematics	42	213	3	23	5
8	Control	C95	Fall 2012	Mathematics	54	242	3	76	4
8	Control	C126	Fall 2012	Mathematics	53	213	2.9	16	4
8	Control	C1	Fall 2012	Mathematics	53	229	3	47	4
8	Control	C6	Fall 2012	Mathematics	83	248	2.9	85	4

8	Control	C79	Fall 2012	Mathematics	26	215	2.9	19	4
8	Control	C83	Fall 2012	Mathematics	96	234	3	59	4
8	Control	C30	Fall 2012	Mathematics	55	206	2.9	8	4
8	Control	C102	Fall 2012	Mathematics	42	236	3	63	4
8	Control	C106	Fall 2012	Mathematics	50	199	3	3	4
8	Control	C125	Fall 2012	Mathematics	80	234	2.9	59	4
8	Control	C89	Fall 2012	Mathematics	58	234	3	59	4
8	Control	C104	Fall 2012	Mathematics	52	238	3	68	4
8	Control	C92	Fall 2012	Mathematics	57	224	3	36	4
8	Control	C50	Fall 2012	Mathematics	61	233	3	57	4
8	Control	C133	Fall 2012	Mathematics	85	242	3	76	4
8	Control	C135	Fall 2012	Mathematics	35	231	3	52	4
8	Control	C36	Fall 2012	Mathematics	82	223	3	34	4
8	Control	C52	Fall 2012	Mathematics	30	219	2.9	26	4
8	Control	C81	Fall 2012	Mathematics	36	229	3	47	4
8	Control	C70	Fall 2012	Mathematics	64	217	3	22	4
8	Control	C8	Fall 2012	Mathematics	52	217	3	22	4
8	Control	C64	Fall 2012	Mathematics	65	237	3	66	4
8	Control	C32	Fall 2012	Mathematics	73	226	3	40	4
8	Control	C134	Fall 2012	Mathematics	76	212	2.9	14	4
8	Control	C76	Fall 2012	Mathematics	83	227	3	43	4
8	Control	C22	Fall 2012	Mathematics	119	227	3.1	43	4
8	Control	C49	Fall 2012	Mathematics	36	214	3	17	4
8	Control	C46	Fall 2012	Mathematics	50	202	3	5	4
8	Control	C127	Fall 2012	Mathematics	59	228	2.9	45	4
8	Control	C23	Fall 2012	Mathematics	73	220	3	27	4
8	Control	C29	Fall 2012	Mathematics	55	206	2.9	8	4
8	Control	C124	Fall 2012	Mathematics	51	202	2.9	5	4
8	Control	C80	Fall 2012	Mathematics	76	208	3	10	4
8	Control	C116	Fall 2012	Mathematics	46	216	2.9	20	4
8	Control	C99	Fall 2012	Mathematics	99	232	2.9	54	4
8	Control	C37	Fall 2012	Mathematics	64	251	3	89	4
8	Control	C63	Fall 2012	Mathematics	66	205	3.1	7	4
8	Control	C98	Fall 2012	Mathematics	63	197	3	3	4
8	Control	C121	Fall 2012	Mathematics	45	218	2.9	24	4
8	Control	C123	Fall 2012	Mathematics	22	215	3.1	19	4
8	Control	C56	Fall 2012	Mathematics	40	224	3	36	4
8	Control	C61	Fall 2012	Mathematics	58	240	3	72	4
8	Control	C51	Fall 2012	Mathematics	98	244	2.9	79	4
8	Control	C94	Fall 2012	Mathematics	69	224	3	36	4

8	Control	C67	Fall 2012	Mathematics	37	219	2.9	26	4
8	Control	C101	Fall 2012	Mathematics	50	220	3	27	4
8	Control	C7	Fall 2012	Mathematics	61	243	3	77	4
8	Control	C20	Fall 2012	Mathematics	52	226	2.9	40	4
8	Control	C131	Fall 2012	Mathematics	34	232	3	54	4
8	Control	C82	Fall 2012	Mathematics	74	234	3	59	4
8	Control	C84	Fall 2012	Mathematics	31	162	3.3	1	5
8	Control	C113	Fall 2012	Mathematics	63	232	3	54	4
8	Control	C58	Fall 2012	Mathematics	83	230	2.9	50	4
8	Control	C43	Fall 2012	Mathematics	87	220	2.9	27	4
8	Control	C54	Fall 2012	Mathematics	83	222	3	32	4
8	Control	C26	Fall 2012	Mathematics	37	208	3	10	4
8	Control	C5	Fall 2012	Mathematics	39	206	3	8	4
8	Control	C68	Fall 2012	Mathematics	101	233	3	57	4
8	Control	C117	Fall 2012	Mathematics	55	216	3	20	4
8	Control	C9	Fall 2012	Mathematics	71	236	3	63	4
8	Control	C42	Fall 2012	Mathematics	69	232	3.1	54	4
8	Control	C77	Fall 2012	Mathematics	73	240	3	72	4
8	Control	C72	Fall 2012	Mathematics	72	225	3.1	38	4
8	Control	C115	Fall 2012	Mathematics	55	193	3	1	4
8	Control	C39	Fall 2012	Mathematics	57	222	2.9	32	4
8	Control	C130	Fall 2012	Mathematics	68	219	3	26	4
8	Control	C103	Fall 2012	Mathematics	37	223	2.9	34	4
8	Control	C2	Fall 2012	Mathematics	63	235	3	61	4
8	Control	C74	Fall 2012	Mathematics	44	225	3	38	4
8	Control	C107	Fall 2012	Mathematics	74	235	3	61	4
8	Control	C105	Fall 2012	Mathematics	56	231	3	52	4
8	Control	C66	Fall 2012	Mathematics	55	227	3	43	4
8	Control	C28	Fall 2012	Mathematics	36	216	3	20	4
8	Control	C69	Fall 2012	Mathematics	97	210	3	12	4
8	Control	C87	Fall 2012	Mathematics	54	220	2.9	27	4
8	Control	C132	Fall 2012	Mathematics	89	224	3	36	4
8	Control	C78	Fall 2012	Mathematics	82	242	3	76	4
8	Control	C118	Fall 2012	Mathematics	65	228	3	45	4
8	Control	C75	Fall 2012	Mathematics	76	234	3	59	4
8	Control	C96	Fall 2012	Mathematics	43	234	2.9	59	4
8	Control	C14	Fall 2012	Mathematics	54	232	3	54	4
8	Control	C85	Fall 2012	Mathematics	32	174	3	1	4
8	Control	C11	Fall 2012	Mathematics	55	222	2.9	32	4
8	Control	C122	Fall 2012	Mathematics	69	224	3	36	4

8	Control	C16	Fall 2012	Mathematics	56	227	3	43	4
8	Control	C13	Fall 2012	Mathematics	34	223	3	34	4
8	Control	C119	Fall 2012	Mathematics	59	209	2.9	11	4
8	Control	C33	Fall 2012	Mathematics	37	208	3	10	4
8	Control	C93	Fall 2012	Mathematics	80	219	3	26	4
8	Control	C112	Fall 2012	Mathematics	66	247	3.1	84	4
8	Control	C24	Fall 2012	Mathematics	58	196	2.9	2	4
8	Control	C129	Fall 2012	Mathematics	98	236	2.9	63	4
8	Control	C41	Fall 2012	Mathematics	45	237	3	66	4
8	Control	C86	Fall 2012	Mathematics	89	244	3	79	4
8	Control	C19	Fall 2012	Mathematics	40	220	2.9	27	4
8	Control	C110	Fall 2012	Mathematics	76	220	3.1	27	4
8	Control	C4	Fall 2012	Mathematics	62	214	3	17	4
8	Control	C40	Spring 2013	Mathematics	57	221	3	22	
8	Control	C90	Spring 2013	Mathematics	63	244	3	70	
8	Control	C18	Spring 2013	Mathematics	51	223	3	26	
8	Control	C48	Spring 2013	Mathematics	150	238	2.9	58	
8	Control	C45	Spring 2013	Mathematics	46	229	2.9	38	
8	Control	C12	Spring 2013	Mathematics	65	242	3	66	
8	Control	C114	Spring 2013	Mathematics	68	212	2.9	10	
8	Control	C128	Spring 2013	Mathematics	36	222	2.9	24	
8	Control	C34	Spring 2013	Mathematics	59	222	3	24	
8	Control	C44	Spring 2013	Mathematics	77	225	3	30	
8	Control	C111	Spring 2013	Mathematics	45	222	3	24	
8	Control	C73	Spring 2013	Mathematics	73	227	3	34	
8	Control	C71	Spring 2013	Mathematics	144	249	3	79	
8	Control	C35	Spring 2013	Mathematics	94	256	2.9	89	
8	Control	C27	Spring 2013	Mathematics	41	230	2.9	40	
8	Control	C108	Spring 2013	Mathematics	28	215	3	13	
8	Control	C97	Spring 2013	Mathematics	79	235	2.9	51	
8	Control	C38	Spring 2013	Mathematics	58	227	3	34	
8	Control	C120	Spring 2013	Mathematics	56	248	2.9	78	
8	Control	C47	Spring 2013	Mathematics	73	216	3	15	
8	Control	C55	Spring 2013	Mathematics	34	237	2.9	56	
8	Control	C88	Spring 2013	Mathematics	119	237	2.9	56	

8	Control	C100	Spring 2013	Mathematics	54	236	3.2	53
8	Control	C31	Spring 2013	Mathematics	76	231	3	42
8	Control	C17	Spring 2013	Mathematics	90	228	3	36
8	Control	C21	Spring 2013	Mathematics	45	212	3	10
8	Control	C95	Spring 2013	Mathematics	50	255	3	88
8	Control	C126	Spring 2013	Mathematics	64	219	3	19
8	Control	C1	Spring 2013	Mathematics	52	231	2.9	42
8	Control	C6	Spring 2013	Mathematics	94	252	2.9	84
8	Control	C79	Spring 2013	Mathematics	33	224	2.9	28
8	Control	C83	Spring 2013	Mathematics	87	227	2.9	34
8	Control	C30	Spring 2013	Mathematics	25	211	2.9	9
8	Control	C102	Spring 2013	Mathematics	34	242	3.2	66
8	Control	C106	Spring 2013	Mathematics	40	203	3	4
8	Control	C125	Spring 2013	Mathematics	100	245	3	72
8	Control	C89	Spring 2013	Mathematics	41	228	2.9	36
8	Control	C104	Spring 2013	Mathematics	69	231	3	42
8	Control	C92	Spring 2013	Mathematics	82	226	2.9	32
8	Control	C50	Spring 2013	Mathematics	53	232	3	44
8	Control	C133	Spring 2013	Mathematics	62	244	2.9	70
8	Control	C135	Spring 2013	Mathematics	25	243	3	68
8	Control	C36	Spring 2013	Mathematics	95	229	3	38
8	Control	C52	Spring 2013	Mathematics	32	226	3	32
8	Control	C57	Spring 2013	Mathematics	127	240	2.9	62
8	Control	C81	Spring 2013	Mathematics	31	230	3	40
8	Control	C70	Spring 2013	Mathematics	77	215	2.9	13
8	Control	C8	Spring 2013	Mathematics	54	216	3	15
8	Control	C64	Spring 2013	Mathematics	47	234	3	49
8	Control	C32	Spring 2013	Mathematics	71	225	3.2	30
8	Control	C134	Spring 2013	Mathematics	41	219	3.2	19
8	Control	C76	Spring 2013	Mathematics	46	231	3.1	42
8	Control	C22	Spring 2013	Mathematics	75	238	3.2	58
8	Control	C25	Spring 2013	Mathematics	90	243	3.1	68
8	Control	C49	Spring	Mathematics	49	222	3	24

			2013					
8	Control	C46	Spring 2013	Mathematics	46	209	2.9	7
8	Control	C15	Spring 2013	Mathematics	42	220	3	21
8	Control	C127	Spring 2013	Mathematics	55	227	2.9	34
8	Control	C10	Spring 2013	Mathematics	154	233	2.9	47
8	Control	C23	Spring 2013	Mathematics	64	233	3	47
8	Control	C29	Spring 2013	Mathematics	36	209	3	7
8	Control	C80	Spring 2013	Mathematics	60	202	2.9	3
8	Control	C116	Spring 2013	Mathematics	59	226	3	32
8	Control	C99	Spring 2013	Mathematics	45	232	3.1	44
8	Control	C37	Spring 2013	Mathematics	53	255	2.9	88
8	Control	C63	Spring 2013	Mathematics	89	204	2.9	4
8	Control	C98	Spring 2013	Mathematics	60	197	3	2
8	Control	C121	Spring 2013	Mathematics	40	226	3	32
8	Control	C123	Spring 2013	Mathematics	81	221	2.9	22
8	Control	C61	Spring 2013	Mathematics	40	235	3	51
8	Control	C51	Spring 2013	Mathematics	74	255	3	88
8	Control	C67	Spring 2013	Mathematics	69	226	3	32
8	Control	C101	Spring 2013	Mathematics	76	225	3.1	30
8	Control	C7	Spring 2013	Mathematics	79	236	3	53
8	Control	C20	Spring 2013	Mathematics	59	236	3	53
8	Control	C109	Spring 2013	Mathematics	27	203	2.9	4
8	Control	C131	Spring 2013	Mathematics	60	234	2.9	49
8	Control	C82	Spring 2013	Mathematics	111	234	2.9	49
8	Control	C84	Spring 2013	Mathematics	36	172	3	1
8	Control	C113	Spring 2013	Mathematics	77	225	3	30
8	Control	C58	Spring 2013	Mathematics	149	237	3	56
8	Control	C43	Spring 2013	Mathematics	75	228	3	36
8	Control	C54	Spring 2013	Mathematics	86	236	2.9	53
8	Control	C26	Spring 2013	Mathematics	25	205	3	5
8	Control	C5	Spring 2013	Mathematics	51	209	3	7
8	Control	C68	Spring 2013	Mathematics	31	223	3	26
8	Control	C117	Spring 2013	Mathematics	73	227	3.1	34

8	Control	C9	Spring 2013	Mathematics	83	236	3	53
8	Control	C42	Spring 2013	Mathematics	44	230	2.9	40
8	Control	C77	Spring 2013	Mathematics	65	247	2.9	76
8	Control	C72	Spring 2013	Mathematics	105	228	2.9	36
8	Control	C115	Spring 2013	Mathematics	52	200	3	3
8	Control	C39	Spring 2013	Mathematics	78	235	3.1	51
8	Control	C130	Spring 2013	Mathematics	74	222	3	24
8	Control	C103	Spring 2013	Mathematics	37	223	2.9	26
8	Control	C3	Spring 2013	Mathematics	85	242	2.9	66
8	Control	C2	Spring 2013	Mathematics	56	254	3.1	87
8	Control	C107	Spring 2013	Mathematics	88	247	2.9	76
8	Control	C105	Spring 2013	Mathematics	130	239	3	60
8	Control	C66	Spring 2013	Mathematics	92	240	3	62
8	Control	C28	Spring 2013	Mathematics	51	219	3.2	19
8	Control	C69	Spring 2013	Mathematics	85	219	2.9	19
8	Control	C87	Spring 2013	Mathematics	54	222	3.1	24
8	Control	C132	Spring 2013	Mathematics	79	238	3	58
8	Control	C78	Spring 2013	Mathematics	105	255	3	88
8	Control	C118	Spring 2013	Mathematics	73	227	3.1	34
8	Control	C96	Spring 2013	Mathematics	65	229	2.9	38
8	Control	C14	Spring 2013	Mathematics	60	225	3	30
8	Control	C85	Spring 2013	Mathematics	16	171	3	1
8	Control	C65	Spring 2013	Mathematics	57	203	3	4
8	Control	C122	Spring 2013	Mathematics	78	221	3	22
8	Control	C16	Spring 2013	Mathematics	85	234	3	49
8	Control	C13	Spring 2013	Mathematics	26	220	3	21
8	Control	C119	Spring 2013	Mathematics	50	216	2.9	15
8	Control	C33	Spring 2013	Mathematics	35	213	3	11
8	Control	C93	Spring 2013	Mathematics	37	206	3	5
8	Control	C24	Spring 2013	Mathematics	34	212	3	10
8	Control	C129	Spring 2013	Mathematics	124	242	2.9	66
8	Control	C41	Spring 2013	Mathematics	57	241	2.9	64
8	Control	C86	Spring	Mathematics	92	242	2.9	66

			2013						
8	Control	C110	Spring 2013	Mathematics	73	218	3.1	18	
8	Control	C4	Spring 2013	Mathematics	30	210	3	8	
8	Low	T111	Fall 2013	Mathematics	36	210	3	12	4
8	Low	T130	Fall 2013	Mathematics	37	212	3	14	4
8	High	T18	Fall 2013	Mathematics	68	233	3	57	4
8	High	T104	Fall 2013	Mathematics	65	235	3	61	4
8	High	T41	Fall 2013	Mathematics	52	221	3	29	4
8	Low	T14	Fall 2013	Mathematics	55	210	3	12	4
8	Low	T95	Fall 2013	Mathematics	78	217	3	22	4
8	High	T38	Fall 2013	Mathematics	50	221	3	29	4
8	Low	T52	Fall 2013	Mathematics	74	211	2.9	13	4
8	Low	T69	Fall 2013	Mathematics	47	193	3.1	1	4
8	Low	T1	Fall 2013	Mathematics	36	212	3	14	4
8	High	T45	Fall 2013	Mathematics	70	228	3	45	4
8	High	T37	Fall 2013	Mathematics	70	229	3.1	47	4
8	Low	T67	Fall 2013	Mathematics	33	193	3.1	1	4
8	Low	T112	Fall 2013	Mathematics	43	192	3.4	1	4
8	High	T132	Fall 2013	Mathematics	58	244	3.1	79	4
8	Low	T31	Fall 2013	Mathematics	73	191	2.9	1	4
8	Low	T24	Fall 2013	Mathematics	81	219	3	26	4
8	High	T54	Fall 2013	Mathematics	77	241	3.1	74	4
8	High	T101	Fall 2013	Mathematics	102	248	3	85	4
8	High	T35	Fall 2013	Mathematics	65	238	2.9	68	4
8	High	T100	Fall 2013	Mathematics	25	232	2.9	54	4
8	Low	T129	Fall 2013	Mathematics	55	218	2.9	24	4
8	High	T135	Fall 2013	Mathematics	117	244	3.1	79	4
8	Low	T80	Fall 2013	Mathematics	66	217	3	22	4
8	High	T71	Fall 2013	Mathematics	55	244	3	79	4
8	Low	T123	Fall 2013	Mathematics	52	223	2.9	34	4
8	Low	T110	Fall 2013	Mathematics	53	215	3.1	19	4
8	Low	T92	Fall 2013	Mathematics	74	226	2.9	40	4
8	Low	T85	Fall 2013	Mathematics	40	218	3.2	24	4
8	High	T15	Fall 2013	Mathematics	52	232	3	54	4
8	High	T13	Fall 2013	Mathematics	82	243	3	77	4
8	Low	T66	Fall 2013	Mathematics	63	207	3.1	9	4
8	High	T96	Fall 2013	Mathematics	36	228	3	45	4
8	High	T141	Fall 2013	Mathematics	104	237	3	66	4
8	High	T62	Fall 2013	Mathematics	65	230	3	50	4

8	High	T88	Fall 2013	Mathematics	71	249	3	87	4
8	High	T60	Fall 2013	Mathematics	78	227	3	43	4
8	High	T118	Fall 2013	Mathematics	73	238	2.9	68	4
8	High	T105	Fall 2013	Mathematics	109	247	3	84	4
8	Low	T109	Fall 2013	Mathematics	75	198	3	3	4
8	Low	T65	Fall 2013	Mathematics	54	213	3	16	4
8	High	T70	Fall 2013	Mathematics	93	255	2.9	93	4
8	High	T20	Fall 2013	Mathematics	60	239	3.1	70	4
8	High	T86	Fall 2013	Mathematics	92	223	3	34	4
8	Low	T119	Fall 2013	Mathematics	53	219	3	26	4
8	High	T8	Fall 2013	Mathematics	75	229	3.1	47	4
8	High	T133	Fall 2013	Mathematics	58	228	3	45	4
8	Low	T43	Fall 2013	Mathematics	112	228	2.9	45	4
8	High	T74	Fall 2013	Mathematics	38	244	3	79	4
8	High	T77	Fall 2013	Mathematics	66	226	3	40	4
8	High	T83	Fall 2013	Mathematics	41	235	3	61	4
8	High	T53	Fall 2013	Mathematics	75	233	3	57	4
8	High	T139	Fall 2013	Mathematics	46	233	3	57	4
8	High	T10	Fall 2013	Mathematics	46	230	2.9	50	4
8	Low	T116	Fall 2013	Mathematics	31	203	3	6	4
8	High	T144	Fall 2013	Mathematics	115	240	3	72	4
8	High	T99	Fall 2013	Mathematics	76	229	3	47	4
8	Low	T94	Fall 2013	Mathematics	61	228	3	45	4
8	High	T81	Fall 2013	Mathematics	56	225	3	38	4
8	High	T39	Fall 2013	Mathematics	47	222	3	32	4
8	Low	T128	Fall 2013	Mathematics	108	230	3.3	50	4
8	High	T49	Fall 2013	Mathematics	67	232	3	54	4
8	Low	T137	Fall 2013	Mathematics	73	224	3	36	4
8	High	T32	Fall 2013	Mathematics	82	230	3.1	50	4
8	High	T30	Fall 2013	Mathematics	81	234	3	59	4
8	High	T46	Fall 2013	Mathematics	74	239	2.9	70	4
8	Low	T90	Fall 2013	Mathematics	36	226	3	40	4
8	High	T55	Fall 2013	Mathematics	79	233	2.9	57	4
8	Low	T29	Fall 2013	Mathematics	66	222	3.1	32	4
8	High	T36	Fall 2013	Mathematics	61	232	3	54	4
8	Low	T40	Fall 2013	Mathematics	24	200	3	4	4
8	High	T106	Fall 2013	Mathematics	52	232	3.1	54	4
8	Low	T6	Fall 2013	Mathematics	52	223	2.9	34	4
8	Low	T102	Fall 2013	Mathematics	47	209	2.9	11	4
8	Low	T79	Fall 2013	Mathematics	51	205	3	7	4

8	High	T125	Fall 2013	Mathematics	85	256	2.9	94	4
8	High	T72	Fall 2013	Mathematics	53	240	3	72	4
8	High	T93	Fall 2013	Mathematics	41	231	2.9	52	4
8	Low	T28	Fall 2013	Mathematics	30	199	3	3	4
8	Low	T97	Fall 2013	Mathematics	59	206	3.1	8	4
8	Low	T27	Fall 2013	Mathematics	22	212	3	14	4
8	Low	T91	Fall 2013	Mathematics	31	203	3	6	4
8	Low	T63	Fall 2013	Mathematics	56	193	2.9	1	4
8	Low	T9	Fall 2013	Mathematics	39	210	3.1	12	4
8	Low	T87	Fall 2013	Mathematics	59	217	3.1	22	4
8	High	T11	Fall 2013	Mathematics	69	240	2.9	72	4
8	Low	T76	Fall 2013	Mathematics	51	199	3	3	4
8	Low	T17	Fall 2013	Mathematics	100	202	3	5	4
8	High	T23	Fall 2013	Mathematics	52	233	3.3	57	4
8	High	T115	Fall 2013	Mathematics	54	224	2.9	36	4
8	Low	T75	Fall 2013	Mathematics	52	219	3	26	4
8	Low	T78	Fall 2013	Mathematics	69	229	3	47	4
8	Low	T103	Fall 2013	Mathematics	70	205	2.9	7	4
8	Low	T51	Fall 2013	Mathematics	26	194	3	2	4
8	Low	T26	Fall 2013	Mathematics	56	202	2.9	5	4
8	Low	T3	Fall 2013	Mathematics	40	194	2.9	2	4
8	High	T142	Fall 2013	Mathematics	59	226	3	40	4
8	Low	T143	Fall 2013	Mathematics	33	212	3	14	4
8	High	T59	Fall 2013	Mathematics	59	230	2.9	50	4
8	Low	T34	Fall 2013	Mathematics	36	206	3.1	8	4
8	High	T82	Fall 2013	Mathematics	82	242	3	76	4
8	Low	T84	Fall 2013	Mathematics	74	212	2.9	14	4
8	Low	T140	Fall 2013	Mathematics	69	224	3	36	4
8	High	T61	Fall 2013	Mathematics	77	244	3	79	4
8	Low	T44	Fall 2013	Mathematics	24	201	3	4	4
8	Low	T16	Fall 2013	Mathematics	55	216	3	20	4
8	Low	T126	Fall 2013	Mathematics	20	195	3.1	2	4
8	Low	T117	Fall 2013	Mathematics	41	207	3.1	9	4
8	High	T64	Fall 2013	Mathematics	55	228	2.9	45	4
8	High	T122	Fall 2013	Mathematics	73	229	3	47	4
8	High	T50	Fall 2013	Mathematics	57	230	2.9	50	4
8	High	T68	Fall 2013	Mathematics	73	230	3.1	50	4
8	High	T58	Fall 2013	Mathematics	66	234	3	59	4
8	High	T33	Fall 2013	Mathematics	60	230	3	50	4
8	Low	T47	Fall 2013	Mathematics	76	222	2.9	32	4

8	High	T107	Fall 2013	Mathematics	65	229	3	47	4
8	High	T98	Fall 2013	Mathematics	81	224	3	36	4
8	Low	T145	Fall 2013	Mathematics	30	210	2.9	12	4
8	High	T19	Fall 2013	Mathematics	72	232	3.1	54	4
8	High	T127	Fall 2013	Mathematics	53	235	2.9	61	4
8	Low	T138	Fall 2013	Mathematics	78	222	2.9	32	4
8	Low	T121	Fall 2013	Mathematics	104	221	2.9	29	4
8	Low	T73	Fall 2013	Mathematics	94	219	3	26	4
8	High	T124	Fall 2013	Mathematics	57	233	2.9	57	4
8	High	T113	Fall 2013	Mathematics	44	226	2.9	40	4
8	High	T5	Fall 2013	Mathematics	69	235	3	61	4
8	Low	T48	Fall 2013	Mathematics	106	228	2.9	45	4
8	High	T89	Fall 2013	Mathematics	55	226	2.9	40	4
8	Low	T108	Fall 2013	Mathematics	42	214	3	17	4
8	High	T57	Fall 2013	Mathematics	86	234	2.9	59	4
8	Low	T2	Fall 2013	Mathematics	64	212	3	14	4
8	High	T12	Fall 2013	Mathematics	49	241	3	74	4
8	High	T134	Fall 2013	Mathematics	132	240	2.9	72	4
8	High	T131	Fall 2013	Mathematics	76	236	3	63	4
8	Low	T56	Fall 2013	Mathematics	80	212	3.6	14	4
8	Low	T114	Fall 2013	Mathematics	66	206	3	8	4
8	High	T42	Spring 2014	Mathematics	94	248	3	78	
8	High	T4	Spring 2014	Mathematics	57	235	3	51	
8	Low	T111	Spring 2014	Mathematics	29	209	2.9	7	
8	Low	T130	Spring 2014	Mathematics	72	232	3	44	
8	High	T104	Spring 2014	Mathematics	126	253	3	85	
8	High	T41	Spring 2014	Mathematics	73	224	2.9	28	
8	Low	T95	Spring 2014	Mathematics	87	217	2.9	16	
8	High	T38	Spring 2014	Mathematics	86	224	3	28	
8	Low	T52	Spring 2014	Mathematics	99	229	3	38	
8	Low	T69	Spring 2014	Mathematics	58	209	3.1	7	
8	High	T45	Spring 2014	Mathematics	132	238	2.9	58	
8	High	T37	Spring 2014	Mathematics	98	231	3	42	
8	Low	T67	Spring 2014	Mathematics	53	194	3	1	
8	Low	T112	Spring 2014	Mathematics	110	200	3	3	
8	High	T132	Spring 2014	Mathematics	77	248	3	78	
8	Low	T31	Spring	Mathematics	62	194	3	1	

			2014					
8	Low	T24	Spring 2014	Mathematics	89	208	3	7
8	High	T54	Spring 2014	Mathematics	91	234	3	49
8	High	T101	Spring 2014	Mathematics	80	264	3	95
8	High	T136	Spring 2014	Mathematics	105	224	2.9	28
8	High	T35	Spring 2014	Mathematics	68	237	3.1	56
8	High	T100	Spring 2014	Mathematics	64	257	3	90
8	Low	T129	Spring 2014	Mathematics	58	225	3	30
8	High	T135	Spring 2014	Mathematics	121	250	2.9	81
8	Low	T80	Spring 2014	Mathematics	49	209	3	7
8	Low	T120	Spring 2014	Mathematics	55	193	3	1
8	High	T71	Spring 2014	Mathematics	90	254	2.9	87
8	Low	T123	Spring 2014	Mathematics	83	223	2.9	26
8	Low	T110	Spring 2014	Mathematics	62	221	2.9	22
8	Low	T92	Spring 2014	Mathematics	66	236	3	53
8	Low	T85	Spring 2014	Mathematics	108	221	3	22
8	High	T15	Spring 2014	Mathematics	61	233	3.1	47
8	High	T13	Spring 2014	Mathematics	119	263	2.9	95
8	Low	T66	Spring 2014	Mathematics	64	219	3.1	19
8	High	T96	Spring 2014	Mathematics	33	228	2.9	36
8	High	T141	Spring 2014	Mathematics	123	237	2.9	56
8	High	T62	Spring 2014	Mathematics	85	243	2.9	68
8	High	T88	Spring 2014	Mathematics	94	267	2.9	97
8	High	T118	Spring 2014	Mathematics	73	241	2.9	64
8	High	T105	Spring 2014	Mathematics	132	261	3	93
8	Low	T109	Spring 2014	Mathematics	81	217	3	16
8	Low	T65	Spring 2014	Mathematics	62	202	3	3
8	High	T70	Spring 2014	Mathematics	132	275	3.1	99
8	High	T20	Spring 2014	Mathematics	126	256	3	89
8	High	T86	Spring 2014	Mathematics	83	222	2.9	24
8	Low	T119	Spring 2014	Mathematics	61	221	2.9	22
8	High	T8	Spring 2014	Mathematics	75	223	3.1	26
8	High	T133	Spring 2014	Mathematics	83	240	3	62

8	Low	T43	Spring 2014	Mathematics	88	229	3	38
8	High	T74	Spring 2014	Mathematics	42	252	2.9	84
8	High	T77	Spring 2014	Mathematics	87	235	3	51
8	High	T83	Spring 2014	Mathematics	53	231	2.9	42
8	High	T53	Spring 2014	Mathematics	95	236	3	53
8	High	T139	Spring 2014	Mathematics	69	242	2.9	66
8	High	T10	Spring 2014	Mathematics	23	218	2.9	18
8	Low	T116	Spring 2014	Mathematics	62	223	3	26
8	High	T144	Spring 2014	Mathematics	63	231	3	42
8	High	T99	Spring 2014	Mathematics	107	242	2.9	66
8	Low	T94	Spring 2014	Mathematics	76	223	3.1	26
8	Low	T21	Spring 2014	Mathematics	26	204	2.9	4
8	High	T81	Spring 2014	Mathematics	55	231	3	42
8	High	T39	Spring 2014	Mathematics	48	239	2.9	60
8	Low	T128	Spring 2014	Mathematics	82	236	3	53
8	High	T49	Spring 2014	Mathematics	60	242	3	66
8	Low	T137	Spring 2014	Mathematics	69	224	3	28
8	High	T32	Spring 2014	Mathematics	82	240	3	62
8	High	T30	Spring 2014	Mathematics	65	242	3	66
8	High	T46	Spring 2014	Mathematics	66	250	3	81
8	Low	T90	Spring 2014	Mathematics	34	228	3	36
8	High	T55	Spring 2014	Mathematics	67	238	3	58
8	Low	T29	Spring 2014	Mathematics	61	234	2.9	49
8	High	T36	Spring 2014	Mathematics	75	232	2.9	44
8	Low	T40	Spring 2014	Mathematics	70	209	3	7
8	High	T106	Spring 2014	Mathematics	71	237	3	56
8	Low	T6	Spring 2014	Mathematics	54	226	3	32
8	Low	T102	Spring 2014	Mathematics	63	214	3	12
8	Low	T79	Spring 2014	Mathematics	64	219	3.1	19
8	Low	T25	Spring 2014	Mathematics	76	219	3	19
8	High	T72	Spring 2014	Mathematics	55	241	2.9	64
8	High	T93	Spring 2014	Mathematics	47	230	3	40
8	Low	T28	Spring	Mathematics	53	212	3.1	10

			2014					
8	Low	T97	Spring 2014	Mathematics	53	213	3	11
8	Low	T27	Spring 2014	Mathematics	70	213	3	11
8	Low	T91	Spring 2014	Mathematics	111	215	3	13
8	Low	T63	Spring 2014	Mathematics	24	191	2.9	1
8	Low	T9	Spring 2014	Mathematics	49	221	2.9	22
8	Low	T87	Spring 2014	Mathematics	73	211	3	9
8	High	T11	Spring 2014	Mathematics	53	239	2.9	60
8	Low	T76	Spring 2014	Mathematics	77	207	3	6
8	Low	T17	Spring 2014	Mathematics	92	206	3.1	5
8	High	T23	Spring 2014	Mathematics	66	229	3.1	38
8	High	T115	Spring 2014	Mathematics	100	238	2.9	58
8	Low	T75	Spring 2014	Mathematics	51	205	3	5
8	Low	T78	Spring 2014	Mathematics	49	224	3	28
8	Low	T103	Spring 2014	Mathematics	78	209	3	7
8	Low	T26	Spring 2014	Mathematics	64	201	3.1	3
8	Low	T3	Spring 2014	Mathematics	66	206	3	5
8	High	T142	Spring 2014	Mathematics	66	231	2.9	42
8	Low	T143	Spring 2014	Mathematics	77	221	3	22
8	High	T59	Spring 2014	Mathematics	124	232	2.9	44
8	Low	T34	Spring 2014	Mathematics	89	208	3	7
8	High	T82	Spring 2014	Mathematics	83	255	3	88
8	High	T7	Spring 2014	Mathematics	108	253	2.9	85
8	Low	T140	Spring 2014	Mathematics	86	233	2.9	47
8	High	T61	Spring 2014	Mathematics	142	245	3	72
8	Low	T44	Spring 2014	Mathematics	40	204	3	4
8	Low	T16	Spring 2014	Mathematics	70	216	3	15
8	Low	T126	Spring 2014	Mathematics	23	191	3.1	1
8	Low	T117	Spring 2014	Mathematics	44	209	2.9	7
8	High	T64	Spring 2014	Mathematics	47	231	3	42
8	High	T122	Spring 2014	Mathematics	113	237	2.9	56
8	High	T50	Spring 2014	Mathematics	89	233	3.1	47
8	High	T68	Spring 2014	Mathematics	94	234	2.9	49

8	High	T58	Spring 2014	Mathematics	122	246	3	74
8	High	T33	Spring 2014	Mathematics	59	223	3	26
8	Low	T47	Spring 2014	Mathematics	68	221	3	22
8	High	T107	Spring 2014	Mathematics	84	235	3.1	51
8	High	T98	Spring 2014	Mathematics	123	238	3	58
8	Low	T145	Spring 2014	Mathematics	47	216	2.9	15
8	High	T19	Spring 2014	Mathematics	74	229	3	38
8	High	T127	Spring 2014	Mathematics	74	244	3	70
8	Low	T138	Spring 2014	Mathematics	83	234	2.9	49
8	Low	T121	Spring 2014	Mathematics	120	223	3.1	26
8	Low	T73	Spring 2014	Mathematics	95	214	3.1	12
8	High	T124	Spring 2014	Mathematics	73	241	2.9	64
8	High	T113	Spring 2014	Mathematics	77	230	3.1	40
8	High	T5	Spring 2014	Mathematics	97	240	2.9	62
8	Low	T48	Spring 2014	Mathematics	99	226	2.9	32
8	High	T89	Spring 2014	Mathematics	89	233	2.9	47
8	Low	T108	Spring 2014	Mathematics	52	219	2.9	19
8	High	T57	Spring 2014	Mathematics	83	239	3.1	60
8	Low	T2	Spring 2014	Mathematics	55	218	3	18
8	High	T12	Spring 2014	Mathematics	52	250	3	81
8	High	T134	Spring 2014	Mathematics	118	259	3	92
8	High	T131	Spring 2014	Mathematics	94	229	3	38
8	Low	T56	Spring 2014	Mathematics	65	208	2.9	7
8	Low	T114	Spring 2014	Mathematics	62	220	3	21