ABSTRACT

Title of Dissertation: THE INFLUENCE OF A SCHOOL DISTRICT'S EARLY CHILDHOOD EDUCATION POLICY ON URBAN STUDENTS' ACADEMIC ACHIEVEMENT TOWARDS ADVANCED CLASS PLACEMENT

Alice P. Bartley, Doctor of Philosophy, 2008

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Kindergarten is one of the most important years of schooling, as it builds the foundational skills needed for later learning. This study explored school district's early childhood education policy reform initiative specifically designed to accelerate the early learning of students in high-need Title I schools. The purpose of this study was to discover if the reform intervention influenced disadvantaged students' enrollment in advanced mathematics classes in grade six. Mathematics and reading assessment data at the second and fifth grades were examined to determine if the kindergarten intervention influenced students' achievement as they progressed through the elementary school years into middle school. This study focused on achievement gains, sustainability, reduction in special education placement, and increase in advanced mathematics classes.

This longitudinal study included a sample of 9858 cases which were distributed among nine kindergarten cohort groups (three intervention cohorts and six comparison cohorts) for three consecutive years (one pre-intervention year and two intervention

years). One-way analysis of variance, hierarchical regression, and logistic regression were used to analyze the dataset.

The major findings of the study indicate the intervention cohorts of students demonstrated mean score gains in mathematics and reading when compared to the cohort group from the same population prior to the intervention. Mean score gains were also found when comparing the intervention cohorts to the six more economically advantaged comparison cohorts. The findings also indicate a reduction in special education enrollment and an increase in enrollment in advanced mathematics at the sixth grade level for the high-need Title I intervention cohorts. The findings of this study contribute to the very limited body of literature on accelerated early learning and later advanced class placement.

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By

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Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2008

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Dedication

This dissertation is dedicated to my mother and father, Mildred and Nathan Bartley.

Your inspiration from above propelled this process.

In memory of my grandmothers,

Elnora Elizabeth Elliott and Alice Bartley

To my youngest sister Tish (Eleanor T. Bartley) –

My “Earth Angel”, Mommy is proud of you. You simply told me to “keep it moving”

and assured that I did. It’s your turn. I am here for you.

I thank you. I love you.

Acknowledgements

This truly has been an incredible, once in a life time experience that I could not have done without the help of almighty God – Thank You Lord. This journey has been accompanied by so many people to whom I am immensely grateful . . .

I would like to first thank the team of people who guided this dissertation – my committee. I thank Dr. Victoria MacDonald for stimulating my thinking and sorting through the possibilities for this study with me even before she became an official committee member. I thank Dr. Donna Wiseman for helping me to conceptualize the ultimate goal for the study and to realize what I was really seeking to discover. I thank Dr. Jennifer Rice for working with me diligently from the beginning to assure I had a solid, well thought-out research study. I thank Dr. Brenda Jones-Harden for helping me with the research design, data analysis plan, and for all of her assistance with this project – she is truly a godsend. Dr. Martin L. Johnson, my advisor and chair, has been right here with me through it all and never lost faith in the possibilities. He is a fine scholar. I wholeheartedly thank him and wish him all the best as he retires . . . after 36 years at the University of Maryland. I feel privileged to close this chapter of his life with him.

To the fine people at the District – without them this study would not have been possible. Each went beyond the call of duty tirelessly to assist this project. I will be eternally grateful to . . . Janine Bacquie, Carol Schatz, Cindy Loeb. I give a heartfelt Thank You from deep within to each of them.

Many thanks to my brothers and sisters – Mildred Fox, Betty Robinson and Dennis Bartley for your prayers; and Nathan Bartley for always assuring my well-being.

To my Auntie Joyce and Uncle Bill Bartley – thank you for your love and prayers.

To Dr. Becky Mercado and Ying Zhang – I thank you for your technical support.

To my Maryland supporters . . . Patti Dowdell, Joy Jones, Dian Poore, Elsie Pratt, Robin Walukonis, Val Wedge, Darcelle Wilson, Dr. Eleanor White, Terrie Lloyd, Tanya Ballard Brown, and William Battle – thanks for all of your assistance and encouragement.

To my supporters from across the states . . . Murphy Hickerson, Ira Wolfe, Mattie Muwwakkil, Brenda Gilchrest, Dr. Teresa Dais, Valerie Herndon, LaTonya McGowan, Rhonda Williams, Victoria Torres, Dr. Phildra Swagger, and Erica Wright – many thanks.

To the UMD grads who blazed the trail and encouraged me . . . Dr. A. Dee Williams and Dr. Saroja Ringo – thank you. To those on the trail now . . . Leslie Kee, Janet Awokoya, Thurman Bridges, and Simon Gibson – I am here for you.

To my "Sister Scholars", Jennifer Bacon, Augustina Bryan, and Regina Young – blessings to you all. Sister Jenn, thank you for always keeping me in your prayers.

To my predecessors in the Academe . . . Dr. Cathy Kea, Dr. Geneva Gay, Dr. Gwen Webb Johnson, Dr. Brenda Townsend Walker, Dr. Will Drakeford, and Dr. Deryl Bailey – thank you for your inspiration and motivation. To you, I pay homage.

To my dear friend Tracy Dace – you have been the voice of reason, thank you.

To my dear friend Tanya Sexton, thank you for keeping me sane and balanced.

To my dear friend Rhonda Fleming, thank you for accepting the assignment to "take a walk with me through the process" – may you be richly blessed continuously.

To my Tommy Totten – we started the journey together and our friendship never wavers. You are more than a friend; you are a blessing. I thank you. I love you. I got you.

To the University Park Baptist Church family, Dr. Claude R. Alexander, and all the praying believers – thank you. Our prayers have been answered . . . Thank You God!

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Chapter 1: Introduction

In the wake of a new millennium, the decades-old problem of disparities in achievement among racial groups and the subsequent repercussions is still prevalent. Over the course of the last decades, increased national attention has been given to the achievement of students who perform academically below proficiency and to the increasing disparity in the academic performance between students of color and their European American and Asian American counterparts (Gay, 1997; Jencks & Phillips, 1998; Noguera & Akom, 2000; Peng & Hill, 1995). Maeroff (2006) contends that providing American's children with the best possible start in school is a viable means to better educational outcomes. Maeroff further avows that his study of standards, curriculum, instruction, and assessment alignment in pre-kindergarten through third grade (pre-K-3) has convinced him that "more attention to a pre-K-3 configuration will strengthen schooling and lay a foundation for improvement in the upper grades" (p. 36).

Experimental and empirical studies have documented that quality early education programs promote school achievement and result in long-term benefits to society and the economy (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Luster & McAdoo, 1996; Ou, 2005; Reynolds, Temple, & Ou, 2003; Schweinhart, 2003). These studies show that quality early education programs are especially beneficial for low-income children who are at risk of poor school outcomes and school failure However, despite these findings, it has become apparent that the leaders and policy makers in the United States are not realizing the importance and benefits of early childhood education (Maeroff, 2006; McCartney, 2006). Maeroff (2006) asserts the Foundation for Child Development's latest Child Well-Being Index indicates a flat line in achievement over

the last three decades (1970s -1990s). According to McCartney (2006), it would be a stretch to say that the United States even has an early childhood education policy, leaving most states to develop a variety of programs through indirect funding sources which are not earmarked for early childhood education programs. Often times, access to these programs is limited.

Background and Rationale

Across the nation, states are aggressively seeking to design and implement policies to address the critical issues of academic performance disparities that exist among racial groups. In most states, efforts and initiatives to approach this daunting task vary and are specific to the policy decisions of an individual school district's Board of Education. The Board of Education for a large school district in a Mid-Atlantic state, hereafter referred to as the "District", decided to establish early childhood education as a high priority. Hence, a policy was enacted to address the academic success of underperforming students attending schools in low socio-economic areas. This decision was based on the Board of Education's knowledge of the strong and growing body of evidence that successful programs during the pre-school and early school years lead to higher levels of student success in school in the later years. Further evidence that early childhood education efforts have been associated with a reduction in dropout rates, juvenile delinquency, teenage pregnancy, unemployment, and other behaviors that impede a child's success in life also contributed to this Board of Education's policy decision.

The District's superintendent believes school districts must start early to have any success in reducing disparity in achievement and prepare young learners to meet the

challenges of rigorous high school courses. His thinking is reflective of the district's demographic layout, which is currently viewed in two areas. One area includes the outer suburban area of the district and the other includes the inner core urban area. Hence, the *Early Childhood Intervention Program* (ECIP) was developed and initially implemented in the inner core urban area of the district which is comprised of the highest need schools. The aim of the intervention is to ensure the success of an accelerated start for the pre-k through grade 2 years. This early childhood education program is the focus of this study.

For decades, school districts have sought reform initiatives to assist in improving the education for all students. Many of the efforts of these initiatives aim to improve the academic performance of underachieving youngsters as compared to those who are meeting and exceeding benchmark standards and assessment goals. Thus, focused attention is needed for the academic disparities that exist among racial groups. Currently, some schools employing whole school reform programs and early childhood intervention initiatives are demonstrating narrowing racial group achievement gaps (Borman, Stringfield, & Rachuba, 2000). Though some progress may be evident, there is still much work to be done. In 2004, the National Study Group for the Affirmative Development of Academic Ability released a compelling report, *All Students Reaching the Top: Strategies for Closing Academic Achievement Gaps* (2004). The Study Group submits "a vision for affirming academic ability, nurturing intellective competence, and moving all students – particularly minority and low-income students – to high levels of academic achievement" (p. v).

This national report suggests that there is a persistent gap between minority and majority students in general, and an even larger gap between high-achieving minority and

high-achieving majority students. Thus, there is an under-representation of African Americans, Hispanics, and Native Americans among high-achieving students. The report further suggests that current attention is primarily focused on the over-representation of minorities on the left end of the academic distribution to the neglect of those on the right end. The National Study Group contends academic ability is a developed and developable ability, one that is not simply a function of one's biological endowment or a fixed aptitude, but a malleable ability. Moreover, the Study Group argues that "closing the gaps in academic achievement between groups of students from different social divisions (class, ethnicity, gender, and language) will require the development of intellective competence in a wide range of individuals through interventions in our homes, communities, and schools" (p. 1).

In light of the work of the National Study Group for the Affirmative Development of Academic Ability, one may question just what could be the best approach not only to increase minority students' achievement to a proficient level in general, but also to enrich minority students' achievement to a high level of proficiency. To conceptualize such a framework theoretically, consideration must be given first to the perspectives and thinking on early childhood education. Early learning theories are important for several reasons: (1) they guide and assist the thinking about how children learn; (2) they help in explaining, especially to parents, how learning occurs and what can be expected of children; (3) they help in the evaluation of children's learning; and (4) they assist in the development of children's programs using the theoretical ideas as a foundation (Morrison, 2000).

Consideration must also be given to the current findings and knowledge on how the brain works and how this knowledge can be infused into pedagogical practices. Research in the field of neuroscience identifies important findings that have the potential to influence thinking about education in the early years starting in infancy. According to Riley (2003), a period of very rapid increase in the development of synapses (the wiring of nerve connections) between the neurons (brain cells) occurs in infancy and childhood. The brain is capable of continued development when used extensively during these periods; it develops optimally in this time span. High-quality education for children should occur in the early years. The more enriched and complex the early environment is, the greater the number of synapses will form (Riley, 2003). These findings support an argument for an enriched environment and sensitive adult support very early in life.

Finally, the National Study Group for the Affirmative Development of Academic Ability proposes that "the education community embark upon a deliberate effort to develop academic abilities in a broad range of students who have a history of being resource deprived and who, as a consequence, are underrepresented in the pool of academically high-achieving students" (p. 29). This effort should include more equitable access to a varied of kinds capital and educational interventions. That said, consideration must be given to educational/bureaucratic systems theoretical perspectives which include specific interventions to affect changes in student performance and school practices; and the extent to which such efforts actually produce "high achievement."

The *Early Childhood Intervention Program* (ECIP) was developed and implemented to fortify the District's early childhood education programming. This program consists of a series of interwoven early childhood education interventions that

include reduced class sizes, full-day kindergarten, revised curriculum, assessments aligned with curriculum, professional development, and increased family/school communication. Moreover, the program is designed to ensure the early success for students in pre-kindergarten through Grade 2. This district's superintendent espouses that strengthened early childhood education programs offset the challenges of poverty, language, disability, and mobility among children. He further professes that the most vulnerable children lag behind their more advantaged peers even before they begin kindergarten and often remain behind throughout their K-12 experience.

Statement of the Problem

Policy-makers, educators, researchers, parents, and various stakeholders across the nation are grappling with the growing concern for how to best *ready the schools for the youngest of learners or ready the youngest learners for the schools.* Growing concern for the academic achievement disparities among racial groups and social classes has heightened the attention given to early childhood education and school readiness. The paradoxical debate of school readiness and child readiness is of critical concern for low income children of color. Moreover, Wilen (2003) states even though the awareness of early education for children has increased in the public's mind, polices and investments still do not reflect society's knowledge of how the human brain grows and how the earliest experiences, beginning at birth, affect a child's future. In light of this, attention to what can be learned from current research on early childhood education programs and their effect on school readiness is paramount. It is also critical to examine the sustainability of acquired early proficiencies among low-income students and students of color as they move through the elementary and secondary grades.

According to Kozol (2005), the differences between the skills that low income children of color bring to formal school and those brought by their dominant culture peers from more affluent backgrounds are polarized. Other researchers such as Lee and Burkam (2002), in their book *Inequality at the Starting Gate: Social Background Difference in Achievement as Children Begin School*, argue that the inequalities children face before they enter school are not often publicized. These researchers further highlight many widely known school quality inequality factors that are preventing education from serving as the great equalizer it should be.

State and local education systems place a significant amount of emphasis on the academic achievement students demonstrate by grade three. The *No Child Left Behind* legislation has determined third grade to be the first benchmark year for assessment of achievement; this assessment benchmark could result in grade retention for underachieving students (NCLB, 2001). Wilen (2003) profoundly proclaims: "If we truly want children to read by third grade, states must adopt the philosophy that children begin learning from their earliest days, weeks, and months. . . The bottom line is: If policymakers fail to include the needs of babies and toddlers as plans are made for universal preschool, in five years our conversations about 'school readiness' will instead be about 'preschool readiness'" (p. 1).

Two issues of the utmost importance are the need to design and implement policy that directly addresses the academic needs of the youngest of learners and mandates continuance of interventions throughout the grades as a seamless process of academic support. School districts must not be complacent if young learners are achieving on grade level, hence narrowing the margins between African American and Hispanic students and

White and Asian students. School districts should aim to further enhance and nurture all student learning to reach maximum potential. This typically is not the focus for national, state, or local policies and programs; at all levels, most are satisfied with assessment scores raised to a level of proficiency. The National Study Group for the Affirmative Development of Academic Ability (2004) calls attention to reducing the academic disparities between more than ethnicity and races, including social class as well. This report compels the education enterprise to afford low-income, resource-deprived students access to opportunities to become high-achievers.

Since children from low-income environments typically start formal school behind their more affluent peers, access to opportunities to learn and excel must start early and continue as these children progress through the elementary school years. According to Maeroff (2006), early gains youngsters are likely to experience in quality pre-kindergarten and full-day kindergarten frequently dissipate as the youngsters move through the primary grades. To sustain these gains, Maeroff suggests reinforcing the gains with a pre-kindergarten through grade three (pre-K-3) continuum of targeted interventions. He further contends, providing full-day kindergarten and aligning learning experiences (standards, curriculum, instruction, and assessment) throughout the pre-K-3 continuum best support sustaining early gains.

The financial demand for additional teachers and staff, materials, classrooms, and other resources needed to support full-day kindergarten raises concern for school districts regarding the short- and long-term benefits of such investments. Recent studies have indicated that students from low socio-economic backgrounds or considered at-risk demonstrate greater academic gains than students not from these populations

(Hildebrand, 2001; Wang & Johnstone, 1999). Full-day kindergarten typically provides a more academic environment, which is criticized by many early childhood experts as being too highly structured and not developmentally appropriate (Bredekamp &Copple, 2002). This opposition is often felt as school district's struggle to prepare young learners to meet the challenges of formal school.

As previously discussed, one Mid-Atlantic school district's effort to suppress the growing achievement disparities among racial and socio-economic groups is the adoption of policy that mandates the implementation of an early intervention program in the areas of the district where the students are deemed to be most at risk of school failure. These urban areas are largely comprised of low-income students of color who attend the highest need schools. The school district superintendent's rationale for such action is that students who are not performing on grade level by Grade 3 have little chance of being prepared for rigorous high school courses. The ultimate goal of the district's early intervention program is for all students to read on grade level by Grade 3.

Because the nation is desperately seeking a "remedy" to racial and socio-economic academic disparities, empirical evidence on students' sustaining the educational experiences of this district's early intervention program as they move through the elementary grades would inform a national agenda. Moreover, scholars and advocates are demanding that students from disadvantaged environments be given access to opportunities to learn and excel as high-achievers. Hence, empirical evidence on this school district's early intervention policy initiative's influence on achievement at the high end of the student placement distribution will provide insight to inform this demand. These concerns are the focus for this study.

The school district's goal is to extend each child's intellectual boundaries and to help all students achieve at their highest potential. Enhancing early childhood education programming improves the school success of children who are likely to experience learning difficulties and reduces special education placements. The general consensus among researchers and educators is that effective interventions in preschool, kindergarten, and first grade will result in later achievement and reduce the need for remedial and special education programs (Slavin, Karweit, & Wasik, 1991). Many scholars voice strong discontent for the growing disproportionate high placement of African American students in special education and the corresponding under-inclusion of African Americans in programs for students who are gifted and talented (Artiles & Trent, 1994; Ford, 1998; Ford & Harris, 1999; Gordon, 2001; Hilliard, 1992; National Alliance of Black School Educators, 2003; Office of Civil Rights, 1994; Patton, 1998; Russo & Talbert-Johnson, 1997). Thus, full attention is needed to address these academic placement concerns.

Assessment scores play a dominant role in student identification and placement decisions. More than 90% of school districts rely on intelligence and achievement test scores to decide if a student should receive special education programming or placement in advanced classes (Colangelo & Davis, 1997; Davis & Rimm, 1997). The gap between the knowledge needed and that possessed by American children living in economically deprived inner-city communities increases as they progress from grade one into further schooling (Saxe, Guberman, & Gearhart, 1989). Specifically, tests of conceptual knowledge administered to groups of kindergarten children attending schools in low-income inner-city communities indicate a significant number of students were unable to

demonstrate the knowledge possessed by their middle-income peers (Case & Griffin, 1990). Chatterji (2005) found significant mathematics achievement gaps in African American, high poverty, and female subgroups at the end of grade one when analyzing a longitudinal data set. With a near exclusive reliance on test scores for academic placement, White and middle class students primarily comprise advanced classes while students of color and poor students dominate remedial and special education classes (Harris, Brown, Ford, & Richardson, 2004)

Though currently no written policy exists to specifically address the mathematics acceleration that is of concern for this study, the school district addresses participation in accelerated instructional placement as follows:

Acceleration of instruction – student are given a curriculum that is at a higher level than the regular curriculum; the information is more complex or more information is covered; the material is presented more rapidly than in typical instruction; and students are confronted by a greater challenge than is customary with on-grade level material. Acceleration may include but is not limited to (a) Advanced placement in a subject (without being assigned to a higher grade, the student is placed for part of the day with students at more advanced grade levels for one or more subjects). (b) Curriculum compacting (the student is given reduced amounts of introductory activities, drill, and review so that the time saved may be used to move quickly through the curriculum). (c) Telescoping curriculum (the student spends less time than usual in a course of study; e.g., completes a one-year course in one semester). (d) Concurrent programming in elementary/middle school, middle/high school, and high school/college. For this study, advanced mathematics placement is the focus.

According to Oakes & Guiton (1995) elementary and secondary schools have tracked students into ability groups since the 1920s presumably to provide them with an education that matches their abilities. Typically, students are placed into one of three groups: high achievers, average achievers, and low achievers or remedial groups. High achieving students prepare for professional positions and college; students in classes for average achievers are readied for more routine support positions; and students in the low-achieving group are prepared for unskilled jobs or for technical training (Harris, Brown, Ford, & Richardson, 2004). The unfortunate reality is the strong, proven correlation that exists between SES and tracking. In one group of 10^{th}-grade mathematics classes, only 14% of the children in the lowest socioeconomic quartile were determined to be above average, whereas almost 38% of those from the highest socioeconomic quartile were enrolled in advanced classes (Ford, 1996). Placement in advanced classes is critical and serves as a gateway to future quality experiences.

Historically, American public schools have relied on ability grouping and tracking to assure that perceived able students are prepared for college while keeping students deemed less able from holding the chosen back. Typically, ability grouping is determined primarily by standardized test scores with less emphasis on school performance. Tracking is less flexible than ability grouping; a student's placement on a track rarely ever changes once it occurs (Harris, Brown, Ford, & Richardson, 2004). For this reason, it is critical for all students to have access to opportunities to learn at a high level as early as possible. Enhancing the quality of the early educational experiences for students of color may be an important mechanism through which these students can be prepared for higher-level academic experiences, such as advanced placement classes.

Significance of the Study

The importance of the need for educational policy to support the efforts of intensive early childhood education cannot be expressed strongly enough. With full cognizance of the alarming achievement gaps among racial groups and economic status, and the empirical data to support the benefits of early childhood education, strong appeals for early childhood education policy at the national, state, and local levels are imperative. Heckman and Krueger (2003) discusses the benefits of intensive early intervention programs, like the Perry Preschool program, which are designed to improve education outcomes of children in low income African American communities. According to Carneiro and Heckman (2003), recent small-scale studies of early-childhood investments in children from disadvantage environments have shown remarkable success.

Though the Perry Preschool program only had transitory effects on participants' IQ scores, it had lasting effects on their achievement test scores, educational attainment, employment, and social outcomes like arrest and teen pregnancies. These economists further state that early childhood interventions of high quality have lasting effects on learning and motivation, raising achievement and non-cognitive skills (such as social skills). Heckman and Krueger (2003) reported the cost-benefit analysis findings of Barnett's (1992) work, which concluded that the social benefits of the program exceeded the costs of the program with long-term benefits such as reductions in crime. In the evaluation of another intensive early childhood program developed for low income African American children, the Carolina Abecedarian project, similar outcomes were found with 35 percent of the participants attending a four-college.

Along this vein, Carneiro and Heckman (2003), suggest that cognitive and non-cognitive abilities affect schooling and economic success. Similar findings were reported for the Syracuse Preschool program which was also developed for disadvantage children. All of these studies indicate that early childhood programs are most effective in changing non-cognitive (social) skills; and they raise achievement test scores (as opposed to IQ scores). The long-term evaluations of these programs are favorable in terms of participants' success in school and society at large. Carneiro and Heckman (2003) also suggest that more studies of the long-term impacts of various small-scale and broad-based early intervention programs are warranted. Since there is a substantial lapse in time between program implementation and the long-term yields, these benefits must be substantial to justify the programs. In light of this, attention should be given to the sustainability of such programs and the equitable opportunity for high achievement for the participants to promote life-long learning for all children.

In his book, *Education and Justice: A view from the Back of the Bus*, Edmund Gordon (1999) discusses the symbiotic relationship between education and social justice. Gordon states that the achievement of universally effective education may not be possible in the absence of contexts in which social justice is valued and practiced. Likewise the achievement of social justice may not be possible in the absence of universally effective education. Gordon further states that there continues to be serious differences between the level and quality of education achievement for children who are from rich or poor families and those from ethnic-majority or some ethnic-minority families. Moreover, Gordon contends that low-status ethic-minority groups continue to be over-represented in low achievement groups and under-represented in high academic achievement groups.

Typically, students who are placed in low-achieving groups tend to remain in these classes throughout the remainder of their schooling. Student in high-achieving groups are most often given higher priority teachers, curriculum, and support. This creates a tracking system that affords students in the high-achieving classes the opportunities to receive more resources and better instruction while students in low-achieving classes do not have equal access to these opportunities (Oakes, 1985). The goal should be to eliminate the low-achieving classes and to develop teaching methodologies and curricula to promote high levels of achievement for all students. To this end, a study of the academic placement of low income urban children, and of the impact of early childhood education experiences on academic placement is warranted.

First, an inquiry of the outcomes of this district's early childhood initiative will provide empirical evidence to inform other school districts in their design and implementation of similar policy. Next, the findings from this study will provide empirical evidence to inform efforts to address the achievement disparities among racial and socio-economic groups, and to inform high achievement efforts for low-income students of color. Lastly, this study will provide empirical evidence to local, state, and national policymakers to make informed and conscientious decisions regarding a hearty policy agenda for intensive early childhood education that accelerates learning for low income children.

Policy should be guided by theoretical underpinnings. In chapter two, I will discuss a theoretical framework that is a composite of early childhood education theory, brain-based learning theory, and educational/bureaucratic systems perspectives. These frameworks will be used to explore the selected school district's early childhood

education program's influence on the academic placement and assessment scores of the student participants. Specifically, this framework will be used to explain how the early childhood intervention reform initiative assists in providing opportunities for students to access advanced mathematics placement.

Research Questions

This study examines the design and distinction of a district's early childhood education policy to improve the academic performance of low income students who live in the urban areas of the district. The following questions are used to study the policy's early childhood intervention program implementation outcomes:

1. How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of second grade students?
2. How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of fifth grade students?
3. How has the achievement gap narrowed between students in Title I schools who participated in the Early Childhood Intervention Program (ECIP) and non-Title I students who did not participate in the program?
4. How does participation in the Early Childhood Intervention Program (ECIP) influence whether sixth grade students receive advanced mathematics placement and experience special education placement?

Definition of Terms

Title I School – a school that receives federal funds to help students in schools with high economic needs achieve high standards; the specific objective of the Title I program is to enable all students to meet state and local student performance standards and for schools to achieve the Adequate Yearly Progress goals set by the state department of education.

Non-Title I School – a school that does not receive federal funds designated for Title I schools.

English Language Learner (ELL) – a student who uses a language in addition to or other than English.

Free or Reduced-priced Meals (FARMS) – meals provided to students who live in low-income households and qualify based on family size and gross income (students may also qualify if they are receiving Food Stamps or Temporary Cash Assistance); foster children are automatically eligible.

Special Education – educational services provided to students who have a documented disability according to federal guidelines and who have a written individualized education program.

Advanced Mathematics B – this Grade 7 course is for students who have completed the Kindergarten to Grade 6 mathematics curriculum as well as the indicators in Middle School Course A (Grade 6 course). Students in Middle School Mathematics Course B will go on to Middle School Mathematics Course C, Investigations into Mathematics, or Algebra I the following year.

Overarching Study Design and Rationale

This study examines the achievement trends and subsequent academic placements of urban and suburban students in a demographically polarized school district, with a particular emphasis on the impact of their receipt of an early education intervention. The school district selected for this study provides a racially and economically diverse population of students that facilitates a view of academic performance in affluent, modest, and meager economic environments. The majority of the affluent area is comprised of predominately Whites, while the low-economic area is mostly comprised with African Americans and Hispanics. Because of the district's interesting distribution of wealth, cohort groups were selected to include students who attend high-need schools, moderate-need schools, and low-need schools. The study also looks at student achievement for Title I and Non-Title I schools.

According to Harris and his colleagues (2004), children from marginalized populations (e.g., African American, Hispanic, poor) will more than double by the year 2020, while the White student population will increase only slightly. The school district for this study shows evidence of this vast increase in culturally diverse groups. Ramey and Ramey (2004) contend that experiences of children from different social classes lead to marked differences in skills and knowledge and that these social-class discrepancies are strongly related to subsequent school performance. They further contend that developmental age and competency differences are even greater when children from high-risk environments are compared with children from learning-enriched environments (Ramey & Ramey, 2004).

The No Child Left Behind Act of 2001 (NCLB) places emphasis on achievement for all groups of students, particularly those who are historically low-achieving, such as ethnic minorities, socio-economically disadvantage, or special needs students. Further, NCLB emphasizes the need to close the achievement gap in key subject areas such as reading and mathematics. Because of the District's diversity in wealth and racial composition, it is an ideal setting to examine the disparities among racial, socio-economic, and ability groups. Moreover, the District is currently implementing an early learning reform initiative designed to not only meet the expectations of narrowing achievement disparities but also to accelerate the learning of all children. Thus, this school district is a premier site to examine achievement among racial and social groups.

To examine the achievement trends of the selected populations, a longitudinal quasi-experimental time-lag cohort design is used for this study. Through the use of standardized assessment scores, this longitudinal cohort study follows nine cohorts of kindergarten students through the elementary school years until enrollment in grade six. Achievement measures at grade two with a national norm-referenced assessment and at grade five with national norm-referenced and state criterion-referenced assessments were taken. The study further examines the cohorts at grades two, five, and six, for placement in special education and enrollment in an advanced mathematics class at grade six. This cohort study involves collecting and analyzing quantitative data to describe changes or continuity in academic achievement and placement from the sample groups.

Comparisons of the achievement and placement between students who attend Title I schools in the urbanized core and those who attend Title I schools in the suburban outer ring are made. In addition, comparisons between students who attend Title I schools

in the urbanized core and those who attend non-Title I schools in the suburban outer ring are made. Comparisons of students attending the Title I schools within the urban core over time are made as well.

In light of the district's demographic configuration and wealth distribution in relation to current research and policy mandates for racial and socio-economic disparities, this school district lends itself to an intriguing study of academic achievement and class placement. Findings from this examination inform the increasing body of literature that addresses the national demographic changes and academic achievement. Moreover, this study extends the limited body of literature that addresses the placement of underserved populations in advanced classes upon the receipt of an early childhood education intervention reform program in kindergarten.

Chapter 2: Review of the Literature

High-stakes assessments and inequitable instructional practices are establishing the norms for educational outcomes. In light of this, it is crucial that research focus attention on maximizing the academic potential and educational experience for all students as early as possible. High school graduation, preparation for post-secondary education, and equipping youngsters to become contributing members of society should be the ultimate goals for all students upon their initial entrance to school. However, these objectives are not guaranteed to all students, neither is the promise of an appropriate and meaningful education. All students need to be challenged and provided rigorous learning experiences that include critical, higher order thinking, and problem solving skills. Mastery of these skills results in higher achievement, and higher achievement ultimately opens the door to life-long learning and rewarding life opportunities.

As national attention is being given to the widened achievement gap among racial groups and legislation is mandating that no child is left behind, one must ask: What is being done to assure these issues are addressed? Though the legislation is relatively new, the questioning is not. As far back as 1933, in his book *The Mis-Education of the Negro*, Carter G. Woodson pondered, “But can you expect teachers to revolutionize the social order for the good of the community?” (p. 145). Retorting to his own question, Woodson stated that, “Indeed we must expect this very thing. The educational system of a country is worthless unless it accomplishes this task. – In the long run, there is not much discrimination against superior talent. It constrains men to recognize it” (p. 145).

This powerful philosophy propels the research proposed for this study. The review of the literature presented seeks to take a close look at how the school district

selected for this study could theoretically promote high achievement for students of color living in urban areas. The district's current early childhood education policy reform initiative was designed to address the achievement discrepancies that exist among racial groups through curriculum revision, professional development, diagnostic assessments, parental involvement, full-day kindergarten, smaller classes, extended learning opportunities, and an instructional management system. In light of this, a discussion of some of the theoretical perspectives on which curricula, teaching practices, and school organizational structures are based is provided.

As schools restructure and adopt school reform initiatives, the mission typically is to target lower performing students from disadvantaged and impoverished backgrounds. Most often, these students are African American and Latino students who live in urban areas and who score significantly lower on national, state, and local standardized benchmark assessments than their more affluent White peers. School reform initiatives rarely aim to promote high achievement and are typically implemented to rescue the school from further ruin and reconstitution. Research indicates that minority students in these settings generally enter formal school with skill deficits and are already behind dominant culture students in the same age group (Kozol, 2005). Though most school reform initiatives aim to ready this population with the fundamental skills and the academic remediation needed to show proficiency in reading and mathematics by the third grade, little attention is given to accelerating the learning for these students beyond an established on-grade level proficiency. It is further noted that this population of students is less likely to attend schools that offer rigorous curricula and high quality teachers who expect them to aim for high academic goals (Gardner, 2006).

National data indicate that minority students are underrepresented among the nation's high achievers (Borman, Stringfield, & Rachuba, 2000). Some evidence suggests that poor and African American students who start out in the early years of school at or above the 50th percentile do not keep pace with the achievement of their White counterparts. National Assessment of Educational Progress (NAEP) tests scores reveal that fourth graders from minority groups are heavily underrepresented among high scorers. The district for this study instituted an early childhood education policy specifically designed to raise the bar and narrow the achievement gap between the most vulnerable children at risk for school failure and their less vulnerable peers.

Like Woodson, Edmund Gordon (2001) compels the education enterprise to take deliberate and swift policy actions to increase access to academic resources for students who are underrepresented among academic high achievers. Gordon purports that an affirmative development policy should include such interventions as early, continuous and progressive exposure to rigorous pre-academic and academic teaching and learning that should begin with high levels of language, literacy, and numeracy development; rich opportunities to learn through pedagogical practices traditionally thought to be of excellent quality; diagnostic, customized, and targeted assessment, instructional and remedial interventions; academic acceleration and content enhancement; the use of relational data systems to inform educational policy and practice decisions; explicit socialization of intellect to multiple cultural contexts; and explication of tacit knowledge, meta-cognition, and meta-componential strategies (p. 3).

An ambitious effort such as that suggested by Gordon requires theoretical underpinnings that are considered the impetus for producing favorable outcomes for

ethnic and minority students who are from low socioeconomic living conditions. Recognizing that early interventions are needed to help identify academic strengths that can be nurtured in students who might not otherwise reach their full potential (Gandara, 2004, cognizance of instructional practices and strategies that are designed to promote meaningful early childhood education is imperative.

The early wisdom of Friedrich Froebel (1904) on kindergarten curriculum design, instructional materials, teacher training, home-school connections, and urban living has contributed to the implementation of early childhood education for centuries. Similarly, the forward thinking of Jerome Bruner (1960) which suggested that any subject can be taught to any child at any age, transformed the curricular offerings to kindergarteners. In addition to these theorists, considerable attention should be given to the work of Eric Jensen (1998) on brain-based research which suggests that intelligence is not fixed and that the brains of youngsters are capable of being stimulated through enrichment programs. Finally, the educational/bureaucratic systems theoretical perspectives, offered by Patricia Gandara (2004, employ student-centered and school-centered approaches to stimulate high achievement in students of color and those from impoverished home environments.

Because of the demographic nature of the research site, these theoretical lenses are valuable when seeking to examine the influence of the district's early childhood education initiative on the academic placement distribution among the racial groups. The following sections will include discussions of these theoretical and conceptual perspectives: early childhood education, brain-based research learning, and educational/bureaucratic systems. A discussion of how these philosophical and

theoretical perspectives have helped to shape the field of early childhood education and how they have manifested in models and approaches for teaching and learning is presented. An examination of some key studies of early childhood education programs is also included in this discussion.

Since Carter G. Woodson's (1933) powerful proclamation to revolutionize the educational enterprise by promoting the talents in students of color occurred in the early 1930s, this discussion will start with a revisit of the history of early childhood education. A review of past occurrences and practices may very well prove to be helpful prior to launching forward with new initiatives.

A Historical Chronology of Early Childhood Education

The history of early childhood education from the 1950s to the present reveals much about the effects of social conditions through the eras of time. According to Schwartz (1997), early childhood education publications from the 1950s through the early 1990s indicate similar beliefs about meeting the needs of young children. The major foci for each era include:

- both environmental and genetic factors influence development;
- the early years are significant for later development;
- early schooling must meet the needs of all children, preparing them to participate as fully as possible in society; and
- education is a, if not the, key to a good life. (p. 343)

In the 1940s and 1950s, kindergartens were perceived as programs for middle-class children (Wortham, 2002). With only 11.9% of women in the workforce in 1950 having children younger than the age of six, most families provided care for their

children at home. Thus, the issue of child care outside of the home was not considered of major importance (Children's Defense Fund, 2001). Prior to the onset of the early childhood education explosion in the 1960s, most American families provided full-time care for young children at home. Mothers, grandparents, and other relatives supervised their children; for the wealthy few, a governess or other paid employee assumed this responsibility (Hamilton, Roach, & Riley, 2003).

Youcha (1995) offers that the few child care programs that existed were designed to foster the psychological development and social skills deemed necessary to maximize primary school performance. Though few in number, some day nurseries and nursery schools were established. Day nurseries were full-day programs developed primarily in response to the necessity of addressing maternal employment among low-income families and were influenced by the social work, rather than the education profession (Michel, 1999). Conversely, nursery schools, attended by children from middle-class families, were half-day programs designed primarily to provide child-rearing advice and social-emotional enrichment beyond a child's home life (Goffin & Wilson, 2001; Schwartz, 1997).

Parent cooperative nursery schools became the somewhat controversial major development of the 1950s. The Parent Cooperative Preschools International (PCPI) was organized in 1964 as a largely parent-run organization that hired professional teachers and/or directors (Hewes, 1995). However, these nursery schools were operated by parent members who also staffed the centers and implemented the concept of a play curriculum. Until the 1960s, only a small proportion of young children attended nursery schools to provide social and play experiences that they may not have received at home. Nursery

schools, parent cooperatives, and playgrounds were utilized by middle- and upper-income families to enrich children's experiences beyond the immediate family; these programs provided continuity between the home and the early learning experiences outside the home (Hamilton, Roach, & Riley, 2003). Though the primary purpose of nursery school was social enrichment, it was assumed that such experiences would stimulate cognitive development as well.

During the late fifties and early sixties, America's concern for the Soviets' launching of the first satellite, Sputnik in 1957, became the impetus to improve mathematics and science in the United States through the use of a more vigorous curriculum at early ages (Morrison, 2000; Schwartz, 1997; Wortham, 2002). An examination of the Soviet educational system concluded that the Soviet Union provided educational opportunities at an earlier age than did the U.S. public schools (Morrison, 2000). After Sputnik, accountability for academic gains became more prevalent in early childhood education; more attention was given to formally teaching academic subjects in kindergarten and at the preschool level. This moved early childhood education into the research spotlight as efforts to improve cognitive growth were explored (Hewes, 1995). Michel (1999) asserts that during the 1950s and 1960s, "although child care was beginning to emerge as a neutral or even positive (if compensatory) service for children, it was still far from being regarded as an ordinary part of everyday life in the United States – or as a mother's right" (p. 161).

The social revolutions of the 1960s dramatically reformed the concept of out-of-home programs and children's school readiness. The emphasis of the Great Society and War on Poverty policies of that era promoted the launching of early childhood education

into a major national focus (Brewer, 2001; Hamilton, Roach, & Riley, 2003; Hewes, 1995; Schwartz, 1997). Unfortunately, according to Schwartz (1997), this era relied on a deficit model that equated early childhood education with early intervention for special needs or at-risk children. Reformers argued that if low-income children scored low on IQ tests and poorly in school, it was because they lacked appropriate intellectual stimulation. In light of this, an important shift occurred from programs that provided custodial care and featured socialization experiences to programs intended to foster intellectual functioning. According to Hechinger (1972), an early educational start is necessary to offset the lack of parental teaching, care, and mind-molding that begins at an early age and progressively limits and eventually blocks entry into the mainstream of society.

As a result of such thinking, the argument in favor of preschool education was virtually uncontestable and gave birth to federally-funded compensatory education programs like Head Start, Follow Through, Home Start, and other programs developed for migrant, bilingual, and special needs populations (Wortham, 2002). Head Start began in 1965 as a major component of the United States War on Poverty as the nation was grappling with issues about its values and traditions and the civil rights movement. A major philosophical shift began to emerge for the delivery of services to families and was incorporated into social and economic development programs at local, state, and federal levels (Hamilton, Roach, & Riley, 2003). According to Hewes (1995), one of the unanticipated results of Head Start was the recognition by middle class parents that their children also needed to attend preschool. Another result was the inclusion of preschool in educational research again, since it was necessary to prove that funds expended upon Head Start were well invested (Hewes, 1995). Federal intervention programs intended to

enhance learning for young children from deprived environments created new emphasis for the importance of the early childhood years. This new focus on preschool yielded the implementation of kindergarten. Since the 1960s, kindergartens have served all populations of children (Wortham, 2002).

As time progressed, the increased interest in child care resulted in endeavors to improve early education. During the 1970s there were repeated efforts to pass legislation to support child care with stalled progress in the 1980s and some positive steps in the 1990s, such as the provision of more federal funds for programs that benefit children (Brewer, 2001). Also, in the 1970s and 1980s, attention was given to accreditation and standards. Throughout the 1970s, thirty-eight professional organizations and thousands of concerned professionals rallied for the development of Federal Interagency Day Care Requirements (FIDCR). It was the intent of the Department of Health and Human Services to enact FIDCR into law by December 31, 1979; however, the FIDCR were withdrawn for further study, and this quest resulted in a futile effort (Hewes, 1995). In 1971, the Child Development Association (CDA), the national credentialing program for professionals working with young children, included positive and productive relationships with families as one of it six competency goals (Hamilton, Roach, & Riley, 2003).

In 1983, a major goal of the National Association for the Education of Young Children (NAEYC) was the establishment of the Center Accreditation Project (CAP). The mission of this project was to stimulate improvement and recognition of good quality programs for young children in the United States. The goal of CAP was not just to recognize high quality programs but to improve the quality of care and education

provided for all young children (Hewes, 1995). Since 1984, NAEYC accreditation has set a standard by which the increasing early care and education programs are measured. Early childhood programs, whether privately owned, cooperative, Head Start, or in the public schools, must undergo a self-evaluation process to indicate whether or not high standards are met. To achieve national accreditation, a program must demonstrate that "Teachers and families work closely in partnership to ensure high-quality care and education for children, and parents feel supported and welcomed as observers and contributors to the program" (p. 30). Moreover, NAEYC developed Developmentally Appropriate Practice guidelines that strongly emphasize healthy parent-teacher relations as essential for appropriate care for young children (Hamilton, Roach, & Riley, 2003).

Kindergarten is believed to be one of the most pivotal times in the educational process. Designed as a program for five-year olds, the structure and programming varies. There is much debate among educators, researchers, and parents as to exactly what a child's experience in kindergarten should include. Some stakeholders believe the intent and purpose of kindergarten is to provide a healthy and safe environment for children to play and learn social skills. Others believe kindergarten is the first step for acquisition of necessary academic prerequisite skills to assure success in formal school. Still others contend there should be a balance between early academics and play; and kindergarten is the place where this should occur.

During the 1980s and 1990s an interest in moving from half-day to all-day kindergarten emerged. This movement was based in part on the need to teach children basic skills to better prepare them for elementary school and in part on the usage of a more formal curriculum to accelerate academic achievement for required elementary

school standardized tests (Wortham, 2002). This movement was met with strong dissention from early childhood specialists who declared that those who advocated that academic achievement could be accelerated failed to understand how cognitive development affects learning (Wortham, 2002). Consequently, a counter-movement supporting a developmentally appropriate curriculum emerged. Developmentally Appropriate Practices (DAP) published by NAEYC received recognition and popularity in the 1990s by some and criticism by others as being too focused on White, middle-class children. As awareness of cultural and ethnic differences became more apparent in early childhood programs, DAP was challenged for not being responsive to all children and their cultures. Because of this challenge, NAEYC revised its position statement and guidelines for DAP. By 1995, the professional status of early childhood educators had been built through close cooperation with other organizations that shared the same concern – the recognition and the importance of families in early childhood programs (Hewes, 1995).

At the end of the twentieth century, issues of cultural awareness and diversity evolved into new approaches to early childhood curriculum. Leaders of this movement, known as "early childhood reconceptionalist" (Wortham, 2002), are concerned with the role of play in the curriculum; inequalities in the curriculum in meeting the needs of children from diverse backgrounds and with diverse abilities; and a lack of access for all children to some early childhood settings (Willms, 1999). Shwartz (1997) purports that fewer and fewer programs provide solely custodial care, with more and more programs emphasizing educational goals for even the youngest learners. Likewise, Zigler and Styfco (2000) convey that those who design interventions today have a wealth of

knowledge available to meet the needs of young at-risk children. Moreover, it is their belief that experience has shown that goals must be clear and realistic, programs must be comprehensive and involve each child's family, services must be of high quality and last long enough to be beneficial, and efforts must be expended on research and evaluation to fill the need for accountability and to inform service improvements.

As Decker and Decker (2001) reflect on the history of early childhood education, they contend that keeping time is a matter of looking forward and backwards at the same time. These scholars assert that the current clock shows that the momentum for early childhood programs has been building for the past four decades and shows no signs of abating. They further contend that early childhood programs are in the forefront among the extensive and varied programs concerned with the total development of human potential; that professionals agree on many factors that make for effective programs; and that research extols the benefits of high-quality programs and the damaging effects of poor ones. To put these scholars' beliefs to the test, the theories that have established the field of human development and programs that are reflective of the theories will be discussed next. As school districts struggle to design appropriate early education settings, many look to the offerings of early childhood education theorists.

Theoretical and Conceptual Perspectives on Early Childhood Education

Early childhood education stakeholders debate whether or not to implement a structured and rigorous curriculum in kindergarten. Some believe that kindergarten is too early to expect youngsters to engage in high-level learning, while others content this is a viable option for young children perceived to be at risk for school failure. Two theorists, Friedrich Froebel and Jerome Bruner, offer valuable perspectives on curriculum and age as it

regards kindergarten programming. The theoretical and conceptual perspectives of Froebel and Brunner are presented here.

Friedrich Froebel's Theoretical Perspective

Early childhood education was fairly undeveloped until Friedrich Froebel devoted efforts towards a cogent plan and analysis of activities for young children (Baun, 1972). Hence, Froebel was the first to develop a systematic, planned curriculum and methodology for educating young children and is credited with founding the first kindergarten in Germany in 1837. This pioneering establishment earned him the distinction "father of the kindergarten." Froebel's farsighted contributions to early childhood educational thought and practice included: (a) freedom movement for the child; (b) a planned sequence of learning activities; (c) emphasis on the relationship and order of ideas; (d) the education and training of mothers, nurses, and perspective kindergarten teachers; and (e) the desire that kindergarten become a state-supported institution (Decker and Decker, 2001; Morrison, 2000).

Terming his school the "children's garden", Froebel worked to match teaching to the nature of the child. He believed that to teach young children, it was necessary to arouse and maintain interest and attention, use the child's curiosity, and plan for motivation (Brewer, 2000). Froebel further believed the educator's role, whether teacher or parent is to observe the natural unfolding of the child and provide activities that will enable children to learn what they are ready to learn when they are ready to learn. The teacher's role is to help children develop their inherent qualities for learning. Moreover, the teacher is responsible for providing guidance and direction so children can become creative, contributing members of society (Morrison, 2000). Educators should provide a

balance between the child's freedom to be himself and the skills, knowledge, and values which allow the child to become a productive member of the larger whole (Baun, 1972).

Froebel's belief in the supreme importance of early education was the impetus for his creation of a method that was simple, philosophical, scientific, and religious (Lascarides & Hintz, 2000). He believed that play is the foundation of children's learning and that part of each day should be spent in play and the rest of the day spent on a teacher-directed curriculum based on what he called gifts and occupations. He believed that appropriate play helps children think about the interactions between life and self-activity, thought and action, representation and cognition, and ability and understanding (Ransbury,1982). Froebel included in his method a respect for the individuality of each child and an organized, articulated curriculum designed to insure the step-by-step progress of that child through the subjects necessary for his or her education.

Froebel's kindergarten method involved precise procedures and specially developed materials that could be replicated in other settings. Through the use of "gifts" (objects), "occupations" (materials), songs, and educational games, Froebel engaged kindergarteners in meaningful play and learning activities using songs to assure lessons were learned. His first sets of gifts included balls of yarn and wooden cubes, cylinders, and spheres. Manipulating these objects in accordance with teachers' instructions, children learned shapes, sizes, colors, and concepts including counting, combining, measuring, contrasting, comparing, ordering, analyzing, dividing, and making fractions out of wholes (Baun, 1972, Morrison, 2000). According to Lascarides & Hintz (2000), Froebel built his entire system of gifts upon mathematical principles and forms. He constantly modified the gifts and his methods, garnering feedback from parents, friends,

former students, and relatives to clarify his thinking and revisions (Baun, 1972; Lascarides & Hintz, 2000).

Using his occupations and other activities (e.g., gardening), Froebel attempted to extend his curriculum and provide continuity between domestic and school activities (Froebel, 1895). Occupations were materials designed for developing various skills, primarily psychomotor, through sewing with a sewing board, drawing pictures by following the dots, modeling clay, cutting, stringing beads, weaving, drawing, pasting and folding paper (Morrison, 2000). Froebel also distinguished between what he called "thoughtless copying" and "deliberate imitation." He believed that when children perform occupations, they restructure their own ideas and do not merely copy actions without thinking about them (Brewer, 2001). Froebel's vision was to use early childhood programs as the bridge between home and school. Historically, many early childhood programs had parent involvement. Likewise, Froebel developed activities for mothers to do with infants (Decker and Decker, 2001). His *Mother Plays* were fingerplays, rhymes, songs, and activities were written to extend the link between home and school.

As a visionary, Froebel saw early childhood education programs as the best hope of reducing poverty of the mind and body (Decker and Decker, 2001). Froebel was an urban man who saw and could understand what factories, life in crowded cities, and the employment of parents out of the home, were doing to small children. His educational system was an answer to these problems. Froebel launched preschool as a planned organized portion of the school (Baun, 1972). Against the background of today's social problems, early childhood programs are seen as support systems for families and in some

ways have come full circle to be the settings they were under the vision of Froebel (Decker & Decker, 2001).

Froebel's early childhood curriculum model of precise procedures and specially developed materials dominated in the United States from the mid-1800s to the early 1900s. At the beginning of the 20th century, some progressive educators argued that Froebel's curriculum was too structured, rigid, and unscientific; others argued for the continued validity of Froebelian tenets. After three decades of public and passionate debate, many kindergartens dismantled their connections with Froebel (Goffin & Wilson, 2001). Although Froebel's structured approach to kindergarten instruction has been discarded by many, modern teachers of young children still employ finger plays and play materials designed to encourage learning, recognize the value of play as a mode of learning, express the importance of recognizing the individual child, and implement other curricular ideas that can be traced back to Froebel and his kindergarten (Baun, 1972; Brewer, 2001; Decker & Decker, 2001; Goffin & Wilson, 2001; Morrison, 2000; Wortham, 2002;).

When Froebel opened his first kindergarten, something genuinely new was added to the very concept of schooling (Braun, 1972). Froebel's affection and concern for children, his attempt to prepare them for later life through a structured kindergarten curriculum model that emphasized mathematics, his belief in purposeful play, his recognition of the conditions of urban children, his development of teacher training, home/school connections, and parent training are the common threads that link his theoretical offerings to the reform endeavor of the District for this study. Since Froebel's time, however, when, how, why, for whom, and in what set of circumstances needed to

be more explicitly defined – hence, a true start of early childhood education of a distinctive, widespread, and enduring variety has begun (Braun, 1972).

Jerome Bruner's Conceptual Perspective

Much like Friedrich Froebel, Jerome Bruner's thinking on curricular offerings for young children was groundbreaking. In his book, *The Process of Education*, Jerome Bruner (1960) articulated "any subject can be taught effectively in some intellectually honest form to any child in any stage of development." (p. 32). Bruner also espoused that there should be a relationship between what a student learns at an early age and what is learned at a later age. Included in Bruner's many contributions to educational research is his study of the development of language, play, thinking, and curriculum. Deneberg and Brunner (1970) contend that intervention programs designed to change elements of the environment in which children grow must not consider the learner as a passive recipient of learning but as an active one. He further emphasizes the need to provide ongoing support for the learner, rather than one-shot approaches that do not achieve lasting effects. Bruner also believes that culture plays a central role in cognition and that school is a cultural setting for learning (Wortham, 2002).

Bruner's hypothesis that any subject can be taught effectively to any child at any stage of development has added weight to the notion that at least some elements of the fundamental ideas of the disciplines should be taught in kindergarten (Kaplan-Sanoff & Yablans-Magid, 1981). Logically, this means cognizance of development and the small gradual acquisition of skill and competence – with age affecting how and which specifics are included in the lessons and curriculum (Brewer, 2001). Bruner's view lead to the concept of a "spiral curriculum" approach (Lascarides & Hinitz, 2000). According to

Bruner (1960), curriculum should revisit basic ideas repeatedly and build on them until the student grasps the entire idea. Moreover, he purports, “Skills are mastered on a day-by-day basis, and once mastered, they permit the development of new skills, which in turn serve, so to speak, as the modules for the development of still higher skills” (1970, p. 114). This implication provides a starting point for thinking about the ways through which adults can promote intellectual development in young children (Riley, 2003).

Scaffolding is another approach which Bruner believes adults can employ to promote the intellectual development of youngsters. In this approach, he advocates that adults assist the novice learner to attain higher levels of intellectual competence than otherwise would be achieved by moving from where the child is to the desired level of achievement (Riley, 2003). Scaffolding should stem from the child’s interests and desires. Teachers provide guidance to students when necessary and engage students in active dialogue to encourage learning. Bruner believes the key to good teaching is to understand the child’s development and how he views the world and then to translate the subject to some form that fits the child’s current views (Brewer, 2001). Moreover, Bruner (1960) contends that an outcome of teaching is to give students a sense of excitement about discovery. However, it is necessary for the school system’s supervisory personnel to deem these views valuable for teacher preparation.

Bruner argues that human development can only be understood in light of one’s cultural context, a fact almost totally neglected in discussion of curriculum models (Goffin & Wilson, 2001). Bruner asserts that culture plays a central role in cognition and that school is a cultural setting for learning. Too, schools should emphasize the importance of language in mediating learning and the importance of play as a stimulus

for innovation in language (Wortham, 2002). Children learn language quickly because human brains seek patterns and order in language just as they seek patterns and order in the environment (Brewer, 2001). According to Bruner and Haste (1987), one who plays and talks with others learns through interactions with parents and teachers. Hence, the child acquires a framework for interpreting experiences, and learns how to negotiate meaning in a manner congruent with the requirements of the culture. In his book, *The Culture of Education*, Bruner (1996) states, "culture shapes the mind … it provides us with the toolkit by which we construct not only our worlds but our very conception of our selves and our powers" (p. x). Additionally, Bruner avows pedagogy is an extension of culture, or perhaps even better, a specialization of it.

Bruner's belief that subject matter can be taught to any child, no matter how young aligns with the District of this study's articulation that schools often postpone the teaching of reading and mathematics in kindergarten because they believe that at this age, children are too young to learn these subject matters. Further, Bruner's concern with early academic achievement and later learning parallels that of the District. Finally, Bruner's belief that "How one conceives of education is a function of how one conceives of culture and its aims, professed and otherwise" (1996, x), conveys the impetus for the District's early childhood education reform. Bruner's theoretical perspectives are manifested through his concepts of a spiral curriculum, scaffolding, and teacher preparation. These theoretical perspectives and concepts are critical components of the District's early childhood education kindergarten reform.

Brain-based Research to Facilitate Learning

Costa and Kallick (2000) purport that many traditionalists view intellect operationally as fixed and unchangeable. Contrary to earlier beliefs, intelligence is not fixed, nor is it an immutable genetically inherited set of capabilities. In his book, *Teaching With the Brain in Mind*, Eric Jenson (1998) provides insight on the malleability of the brain. Jensen discusses the 1967 research of brain pioneer neuroanatomist, Marian Diamond. According to Jensen, Diamond's studies and subsequent research by dozens of colleagues have changed the current thinking about the brain. Diamond concluded that the brain can literally grow new connections with environmental stimulation. She avows that enriching the environment results in brains with a thicker cortex, more dendritic branching, more growth spines, larger cell bodies, and more support cells. Consequently, brain cells communicate better with one another. The junction communication point, where neurons interact and where changes take place, is called synapse. These changes can occur within 48 hours after stimulation. Later studies of Diamond's work support the conclusions that these are predictable and highly significant effects such as stimulated brain cortical areas associated with mathematics and spatial reasoning (Morrison, 2000).

Jensen (1998) states the process of making connections is what counts. Researchers report that increased neural stimulation suggests a possible cause for the enhanced learning capacity of disadvantaged learners (Costa and Kallick, 2000; Jensen, 1998; Lasley, 1997). Furthermore, Black, Issacs, Anderson, Alcantra, and Greenough (1990) contend that smarter people most likely have a greater number of neural networks that are more intricately woven together. Thus, the changes match up favorably with those gained from complex experiences, specifically with learning and memory. There is

now evidence of dendritic branching and synaptic plasticity. It is now known that the brain modifies itself structurally depending on the type and amount of usage (Healy, 1990), particularly during early childhood. Synaptic growth varies depending on which kind of activity is given. It has been discovered that the brain has areas that are only stimulated by letters, not words or symbols (Lasley, 1997). This finding suggests that new experiences such as reading can be wired into the malleable brain. Jensen further contends that a student's early sensory deprivation can also play a role. According to Greenough (1991) the wrong synapses are shed and the system malfunctions if there is an adverse experience. As the environment is varied; the brain varies in the way it is developed.

Further discussion by Jensen (1998) suggests that currently there is more interest than ever in creating the right kind of enriching environments. Frederick Goodwin, former director of the Institute for Mental Health, asserts that a person with a 70 IQ cannot be made into a person with a 150 IQ (1993). However, the IQ measure can be changed in different ways, perhaps as much as 20 points up or down, based on the environment. Research by neuroscientist Bob Jacobs concluded that frequent new learning experiences and challenges were critical to brain growth. Challenging sensory stimulation has been compared to a brain nutrient (1999). Neurobiologist, Harold Chugani (1999), adds that the brain learns fastest and easiest during the early school years; it nearly explodes with spectacular growth as it adapts with remarkable precision to the world around it. Further, during this time of rapid growth, stimulation, repetition, and novelty are essential to laying the foundations for later learning. Jensen (1998) posits that "The outside world is the growing brain's real food. It takes in the smells, sounds,

sights, tastes, and touch and reassembles the input into countless neural connections. As the brain begins to make sense of the world, it creates a neural farmland" (p. 32).

Lastly, Jensen (1998) addresses enrichment and disbands the myth that for many years only certain "gifted and talented" students would most benefit from enrichment programs. The brain has a baseline of neural connectivity, and enrichment adds to it. Experience determines which synapses are shed or, more importantly, which are retained. Interestingly, students can graduate from school with a baseline or an enriched brain. Jensen begs the question: "Can we really afford to rob all of the "nongifted" students of their biological destiny to grow an enriched brain?" (p.32). Jensen declares that neuroscientist, Paul Tallal, comments that everyone should get this critical learning opportunity.

When answering the question, "What conditions predictably and precisely build a better brain?" Jensen defers to William Greenough, who has studied the effects of enriching environments for over 29 years. Greenough states that there are two things of critical importance in growing a better brain. Any purposeful program to enrich the learners' brain must first assure the learning is challenging. Secondly, there must be some way to learn from the experience through interactive feedback. Challenging learning should include problem solving, critical thinking, relevant projects, and complex activities. Likewise, feedback should be specific, multi-modal, timely, and learner-controlled.

Jensen (1996) believes when teaching is designed around the basic principles of how the brain learns; motivation, meaning, and recall increase for all learners. He further considers this style of teaching and learning to be a quick-moving paradigm shift that is

not an add-on or passing notion. This conceptualization of learning is forcing educators to rethink and reinvent classrooms across the nation. The use of brain-based instruction has significantly increased the academic success of diverse learners. When answering the question, "What should be the content of enrichment?" Jensen admits the sources are endless. He limits his suggestions to reading and language, motor stimulation, thinking and problem solving, the arts, and the surroundings.

Researchers and educators are giving increased attention to designing instruction around how the brain learns. The district selected for this study is no different. Seeking to provide a population of students who are often disenfranchised and marginalized the opportunity to excel early in their educational career, this district is utilizing brain-based research to improve its curricular offerings. Through the use of a revised kindergarten curriculum and tiered instructional presentations, the District is hoping to enrich the learning of low income, African American, and Latino students in the highest need schools. Moreover, the District's aim is provide these youngsters with an early accelerated start to improve the possibilities for their later lives.

Educational/Bureaucratic Systems Perspectives

In her monograph, *Latino Achievement: Identifying Models That Foster Success,* Patricia Gandara (2004) seeks to inform the field of research on the low achievement of Latino students and students of color. She identifies structural and socio-cultural barriers to academic achievement for this group, which includes poverty, poor schooling, language differences, low educational levels of parents, and lack of social capital. Gandara offers several theoretical models to explain why some students of color manage to defy the odds and succeed academically in spite of the barriers. Moreover, she

provides suggestions for both policies and practices that should be expected to yield greater academic achievement for Latino students in the future.

The theoretical perspectives and suggestions discussed here are to be considered for Latino and African American students since Latinos score only slightly better than African Americans on most indicators of academic achievement (Harvey, 2002). Further, in a study of the impact of specific programmatic interventions on the academic achievement of low income and minority students, Stringfield et al. (1997) found large achievement gaps between Whites and Latinos remained relatively constant across six elementary grades. Additionally, 6.63 percent of African Americans and 8.56 percent of Hispanics participated in K-12 gifted and talented classes compared to 76.61 percent of Whites (USDOE, OCR, 2000). Thus, there is similarity between the academic performance of African American and Latino students.

Gandara (2004) offers some salient points to explain the underachievement of Latino students. Included in these explanations are (a) parental income and educational background, (b) inadequate pre-kindergarten opportunities, (c) high rates of residential mobility, (d) lack of peer support for academic achievement, (e) racial and ethnic stereotyping, (f) extracurricular involvement and support, (g) low expectations from teachers, (h) quality of instructional offerings, (i) quality of teachers, (j) segregation of minority students within and between schools, and (k) limited English proficiency. Despite these viable explanations for low student achievement, some students of color perform exceptionally well. To explain high achievement in adverse circumstances, Gandara uses four theoretical perspectives: psychological (intrapersonal), sociological (extrapersonal), anthropological (socio-cultural), and educational (bureaucratic systems).

Clearly, no one perspective results in high achievement in isolation. Each makes a significant contribution to the end results. Specific attention is given here to the educational/bureaucratic systems theoretical perspectives.

Gandara (2004) describes the educational/bureaucratic systems theoretical perspectives as a hybrid model that is inclusive of the work in school reform and the social organization of schooling. She considers these perspectives to be more "theories of actions" rather than merely explanatory frameworks that seek only to describe the phenomenon of Latino and students of color high achievement in the face of adversity. These theoretical perspectives tend to be more grounded in practice. Educational/bureaucratic perspectives focus on the ways in which schools and educators intervene to either changes in student performance or changes in schooling practices. Gandara explores two theoretical perspectives: (a) a student-centered approach, and (b) a school-centered approach.

Student-centered Approach

The achievement gaps between racial groups – Latinos, African Americans, and Native Americans as one group and White and Asian Americans as another - have heightened the interest of researchers in the understanding of student-centered programs as a means to produce high achievement in students of color and disadvantaged students. Using the student-centered approach, high achievement for Latinos and African Americans can result from the provision of interventions in the lives of individual students with very specific and targeted instruction and guidance. This support is often programmatic in nature with adults being assigned to work with individual students to maximize their potential. Student-centered programs include the panoply of programs

and activities that target specific students for intervention to raise their achievement, reduce drop-out rates, and often to proceed to college. Some of the activities involve ancillary school services, such as counselors and psychologists. However, these services are rarely included in high achievement goals; and are commonly the focus of prevention initiatives.

Though most intervention programs in the schools that aim to narrow the achievement gap for low income and ethnic minority students are focused on students at risk of school failure, some programs may attempt to stimulate high achievement and may therefore include a less at-risk population. These programs are usually referred to as college access programs and usually enroll students who demonstrate high potential but may not complete high school or transition to college because of the risks in their environment such as poverty, low parental education, or inadequate schools. A critical strategy used by most of these programs is the removal of students from either dead-end curricular tracks or dead-end schools and introducing new settings where the education rigor and support are increased.

Gandara posits that "the 'theory of action' behind this strategy is that capable young people will be able to flourish intellectually and academically if provided the appropriate curriculum and support to access that curriculum" (p. 30). Often, students in secondary schools who have a lengthy school history and significant deficits in their learning, if not in their achievement, are enrolled in such programs. Ambitious students who attend low income schools often earn "A's" for work that would not qualify for a "C" in more affluent schools (The Education Trust, 2001). Often students who have been placed in low-end courses are not initially prepared to tackle both a rigorous curriculum

and the strong competition posed by fellow students who come to school well prepared and socially and economically advantaged. In light of this reality, the effectiveness of such programs depends on the programs' ability to support students socially and emotionally as they transition into these new environments.

School-centered Educational Interventions

The school-centered perspective views the high achievement of students of color as the product of fundamentally reformed schooling conditions and practices in which these students are deemed assets rather than a resource drain on the system. Considerable attention has been directed toward school-centered perspectives due to the awareness of the limitations of intervention programs that serve only a small number of students and intervene late in the educational career of these students. The "theory of action" behind school-centered programs is to change the entire ethos of the school such that more children can be served with interventions that are broader and more sustained.

One strategy is to offer a high level curriculum to all students. According to Oakes and Wells (1998), an example of this strategy would be the various efforts that have been made at *detracking* schools. However, the long-term effects of these strategies on raising student achievement are not known. Another example is Comer's school-centered program, which aims at raising the achievement of all students with a primary focus on African American students. This program includes heavy parent and community involvement, with the community taking responsibility for schooling outcomes.

Other supports to the whole school model include the works of Benard (1996) and Renzulli and Reis (2000). Benard purports that whole schools need to intervene with appropriate support to nurture resiliency in low-income, disadvantaged students. Renzulli

and Reis recommend the School Enrichment Model to meet the needs of all students. This model offers more rigorous curricula that are tailored to individual strengths and needs. Though the research on school reform is extensive, there is minimal evidence of the effects of these efforts for increasing the incidence of high achievement among Latino and African American students (Renzulli & Reis, 2000).

As previously discussed, a school-centered educational intervention provides a rigorous high-level curriculum to larger numbers of students as an effort to curtail tracking practices. Disadvantaged students from low-income environments are frequently placed into low-level tracks (Oakes, 1985). Full-day kindergarten programs are designed to nurture resiliency in low-income, disadvantaged students at an early age and to provide a curriculum with the fundamental pre-requisite skills needed for later learning (Elicker & Mathur, 1997). Recent studies have validated the belief that an early start will provide sustained and continued learning as kindergarteners progress through the elementary years (Cryan, Sheehan, Wiechel, & Brany-Heddan, 1992; Elicker & Mathur, 1997; Hough & Bryde, 1996). Specifically, many disadvantaged children in full-day kindergartens outperformed those in half-day kindergartens in reading, language arts, and mathematics (Hough & Bryde, 1996). Moreover, parents and teacher attest to the benefits of full-day kindergarten (Finn & Pannozzo, 2004). In light of these findings, full-day kindergarten complements a school-centered educational intervention structure.

Early Literacy

Socioeconomic status (SES) is one of the strongest predictors of reading performance differences in children at the beginning of first grade (Alexander & Entwisle, 1988). Futhermore, Cunningham and Stanovich (1997) found that first grade

reading ability is a strong predictor of a variety of 11th grade measures of reading ability. Investigations of early literacy conclude that children from less economically advantaged and non-English speaking home are at a disadvantage even before the start of formal instruction in reading and writing (Zill, Collins, West, & Hauskin, 1995). Thus, children from low-income families are at risk for reading difficulties (Dubow and Ippolito, 1994). Further, Whitehurst and Lonigan (1998) conclude there are large social class differences in children's exposure to experiences that might support the development of emergent literacy skills. Studies have documented differences in the ownership of books and frequency of shared reading time between lower SES and higher SES families (Raz & Bryant, 1990); and that mothers from lower SES groups engage in fewer reading teaching behaviors than mothers from middle-class groups (Ninio, 1980). Because children are entering formal school settings without needed skills to be successful readers, preschool programs that aim to promote emergent literacy in children from low-income backgrounds are more prevalent.

Emergent literacy consists of the skills, knowledge, and attitudes that are presumed to be developmental precursors to conventional forms of reading and writing (Sulzby & Teale, 1991). It also includes environments that support these developments (Lonigan, 1994). An emergent literacy perspective considers literacy-related behaviors occurring in the preschool period as legitimate and important aspects of literacy (Whitehurst & Lonigan (1998). The term "emergent literacy" denotes the idea that the acquisition of literacy is best conceptualized as a developmental continuum, with its origins early in the life of a child, rather than an all-or-none phenomenon that begins when children start school. According to Britto, Fuligni, and Brooks-Gun (2006), oral

language and literacy interactions begin at birth and set the stage for early literacy development with the end point not linked to chronological age or school entry but rather to the point at which literacy skills are mastered. Key to later reading success are early knowledge of the alphabet and alphabetic principles (Adams, 2001) and an understanding of the relationship between sounds and letters (Bear, Invernizzi, Templton, & Johnson, 1996).

Whitehurst and Lonigan (1998) propose an emergent literacy model that consists of two distinct domains: *outside-in skills* and *inside-out skills*. In this model, the outside-in skills represent children's understanding of the context in which the writing they are trying to read (or write) occurs. The inside-out skills represent children's knowledge of the rules for translating the particular writing they are trying to read into sounds (or sounds into print for writing). Outside-in processes include

- *Language* – semantic, syntactic, and conceptual knowledge;
- *Narrative* – understanding and producing narrative;
- *Conventions of print* – knowledge of standard print format (left-to-right, front-to-back orientation); and
- *Emergent reading* – pretending to read

Inside-out processes include

- *Knowledge of graphemes* – letter-name knowledge;
- *Phonological awareness* – detection of rhyme, manipulation of syllables and individual phonemes;
- *Syntactic awareness* – repair grammatical errors;

- *Phoneme-grapheme correspondence* – letter-sound knowledge, pseudo-word decoding; and
- *Emergent writing* – phonetic spelling.

Other factors included in the model are

- *Phonological memory* – short-term memory for phonologically coded information (numbers, nonwords, sentences);
- *Rapid naming* – rapid naming of serial lists of letters, numbers, or colors; and
- *Print motivation* – interest in print shared reading.

Though there is much debate over how early reading should be taught, there is general consensus that phonemic awareness should be taught in kindergarten. Griffith and Olsen (1992) define phonemic awareness as the understanding of the structured language. Some scholars advocate for teaching early reading skills in a whole language approach, which is a meaning-based whole text model, while others suggest a direct instruction approach, which is a skills-based basal text model (Asselin, 1999). To create a balance between whole language and direct instruction, a balanced literacy approach is often used. This approach gives balance between instructional time and practice, whole group and small group instruction, skills, comprehension and fluency (Fontas & Pinnell, 1996).

Researchers and practitioners agree that children need to be taught both phonemic awareness, by which they develop an awareness of individual sounds and cueing strategies, through which they learn to decode the text and comprehend material (Kelly, 1997). Conceptually, balanced reading instruction combines both whole language and phonics approaches. Furthermore, the theoretical base for a balanced literacy approach is cultural and psycholinguistic (Freppon & Dahl, 1998). According to Freppon and Dahl

(1998), balanced literacy requires thoughtfully planned instruction based on children's backgrounds, interests, strengths, and needs. Carbo (1997) asserts balance literacy responds to different learning styles. Analytic and auditory learners benefit from phonics instruction, while visual, tactile, and global learners tend to profit from a whole language approach. Further, the different stages of reading acquisition require different approaches. Bond and Dykstra (1997) conclude that children learn to read by a variety of materials and methods, and a combination of approaches is often more effective. The balanced literacy approach combines the language and the literature-rich activities associated with whole language and explicit teaching of the skills needed to decode words for all children (Honig, 1996). Balanced literacy infuses skills and strategies in context across disciplines (Weaver, 1998).

Early Numeracy

As is true for early literacy, the general consensus for early numeracy is that children who have more mathematics opportunities outperform children without those opportunities or advances in early mathematics instruction (Arnold, Fisher, Doctoroff, & Dobbs, 2002). Along this vein, Johnson (2004) contends there are national disparities among racial groups in mathematics performance, with African American children lagging significantly behind their White and Asian peers. He further states that the goal should be for all children to perform at a high level and that solutions should be identified to address high performance for all. Shepard, Kagan, and Wurtz (1998) purport that a general principle of plausible curricular reform is to come to consensus on what constitutes early school readiness and to use this information to monitor children's early growth for expected outcomes. Research suggests that long-term high school outcomes

can be traced back to identified prerequisites, levels of typical performance, or benchmarks that precede or predict performance (Priest, et al., 2001).

Defining early numeracy is much like defining early literacy in that children developing number sense reach certain benchmarks that indicate the development of a skill, concept, or set of skills. Early numeracy is founded upon establishing the idea of *number sense* and includes the concepts of quantity, representation, and change underpinning the notion of number (Aubrey, 2001). Conceptually similar to literacy, numeracy is comprised of shared universal characteristics (operations, rules, number concepts) intended to communicate ideas through specialized symbolic notation (Gersten & Chard, 1999). According to the National Research Council (2000), the notion of numeracy is structured around the concept of number as well as in brain-based conceptual nodes, and can be deeply embedded in the formal techniques of schooling. Wu (1999) extends this thinking to include a connection between the skills embedded in school curricula and those skills encouraged at home for student success as numerate citizens.

Baroody (2004) classifies knowledge as *informal* and *formal* to distinguish early conceptual skills and later, school-based operational skills. This scholar asserts that informal skills develop before formal schooling and thus can predict proficiency with arithmetical operations. He further states that basic informal skills and concepts rest on a foundation of informal mathematics that is constructed before children enter kindergarten. Developmentally, children move through three phases: pre-counting, counting, and written numbers (including pre-symbolic and symbolic stages). To prevent mathematical failure, Clements, Sarama, and DiBiase (2004) contend that children at risk

of school failure need to build the informal knowledge that provides the basis for later learning of mathematics. Proficiency and fluency of informal knowledge builds the foundation that serves as the prerequisite to the formal knowledge for children.

Formal knowledge is knowledge learned as a result of formal schooling (Baroody, 2004) and/or knowledge encoded in symbols (Clements, et al., 2004). Aubrey (2001) suggests that children who have difficulty with counting, with comparing, and with the mental representation of numbers have great difficulty in school mathematics, where symbolic understanding becomes emphasized. Baroody (2004) purports meaningful school learning is based on both conceptual prerequisites and skill fluency, with the assumption that formal knowledge is reinforced in school and emphasizes symbols and procedures critical to later school learning. In light of the link between early performance and later achievement, Aubrey (2001) concludes it is essential to determine the competencies necessary for student success that if lacking, could place the child at risk for school failure. Too, the need for teachers to focus on a set of conceptual and skill-based prerequisites to effectively instruct and support students with diverse learning needs is of the utmost importance (Priest et al, 2001).

Aubrey (2001) stresses the need for early math programs to better address the identification of informal (at-home learning activities) and formal (in-school instruction) knowledge-based instructional systems. In 2000, the National Council of Teachers of Mathematics (NTCM) submitted a set of curricular standards for each grade level. These principles are a research-based set of guidelines designed to establish unifying activities for assessment and instruction to increase student performance, proficiency, competence, and self awareness in mathematics (NCTM, 2000). Throughout the early years (Pre-K-2),

the *2000 NTCM Standards* provide expectations and recommendations that can help parents and educators give children a solid affective and cognitive foundation in mathematics. According to the *NCTM Standards* (2000), "Appropriate mathematical experiences challenge young children to explore ideas related to patterns, shapes, numbers, and space with increasing sophistication" (p. 73).

In kindergarten through grade two, high quality education and experiences are paramount; these are requirements for children's long-term success in learning and development (NCTM, 2000). Hence, "it is imperative to provide all students with high-quality programs that include significant mathematics presented in a manner that respects both the mathematics and the nature of young children" (NCTM, 2000, p.76). The *2000 NCTM Standards* support the belief that early education must build on the principle that all students can learn significant mathematics and that all students need adequate time and opportunity to develop, construct, test, and reflect on their understanding of mathematics. These thought-provoking opportunities to learn must occur in natural and mathematical language rich environments where uniqueness is valued and exploration is supported through challenging problem-solving and encouraging persistence (NCTM, 2000).

The *2000 NCTM Standards* are interwoven strands designed to support connected mathematical ideas with Number and Geometry Standards at the core of mathematics at the early years. Numbers and their relationships, operations, place value, and attributes of shapes are components of these standards. Each of the other Mathematical Content Standards (including Algebra, Measurement, and Data Analysis and Probability) contributes to, and is learned in conjunction with the Number and Geometry Standard.

Additionally, the mathematics program in pre-kindergarten through grade two should utilize technology. Computers, and calculators allow students to explore number and pattern, focus on problem-solving process, and investigate realistic applications. The *2000 NCTM Standards* reflect awareness that children are likely to enter school settings with an array of mathematics understandings levels and that some children will need additional support to prevent starting school at a disadvantage. The contention is "'not knowing' more often reflects a lack of opportunity to learn than an inability to learn" (NCTM, 2000, p.75).

Focusing on the direct needs of Latino and African American students is the prime objective of the ECIP reform initiative. Gandara's idea to utilize specific and targeted instruction with these groups of students is congruent with the tenets of the reform. Further, Gandara's view of the value of the child supports the District's belief in the need to invest in this at-risk population. Through the development of early literacy and early numeracy skills, the District seeks to accelerate the learning of its kindergarten students. Providing intensive attention to highest needs schools, comprised mostly of African America and Latino students, the District hopes to increase the achievement of these most vulnerable students to the highest level.

Early Childhood Education Research for Low Income Children

Growing concern for the academic achievement disparities among the races has heightened the attention given to early childhood education and school readiness. The question of whether children should be ready for schools or if schools should be ready for children has become a common debate. This paradoxical question is of critical concern for low income children of color. Consideration of what can be learned from current

research about the effects of early childhood education programs on school readiness and the sustainability of these proficiencies among low income students of color based is given here.

According to current research, early childhood education programs vary in design from half-day to whole-day, partial year to year-round, and from structured curriculum to no curriculum. Teacher training and staff development are sometimes included in the program design, as well as extensive involvement of teachers, managers, and principals. In addition to the provision of educational support, some programs offer pediatric services on-site. Other programs provide off-site services such as health and nutrition care, social services, coordinated parent-school-community services, home visits, parenting education, child care, and case management. (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Campbell & Pungello, 2000; Luster & McAdoo, 1976; Ou, 2005; Reynolds, Temple, & Ou, 2003; Sweinhart, 2003)

The most prevalent longitudinal studies of early childhood programs in the current body of literature are the Chicago Parent-Child Center, the High/Scope Perry Preschool, and the Carolina Abecedarian Program. The research on these studies provides enlightening information on the early childhood programming that has contributed to success among low income students of color and provides the characteristics and features of programs that could be useful with the population targeted for this study. When seeking to provide high-quality programming for low income students of color, the features of these programs and the conditions that support those features warrant further attention. In essence, high-quality early childhood programs are comprehensive model programs that include features and supporting conditions that offer both cognitive and

social provisions, which produce long-term benefits, to economically disadvantaged children of color and their families. A discussion of the High/Scope Perry Preschool, the Chicago Parent-Child Center, and the Carolina Abecedarian Project is presented here. An overview of studies on these programs is provided in Appendix A.

High/Scope Perry Preschool

The High/Scope Perry Preschool Study is one of the pioneering studies of preschool research. It is one of the first studies to identify the lasting program effects on participants' later educational achievement, economic success, and avoidance of criminal activity, also finding a return on public investment in the program. Data have been collected from ages 3-11, 14, 15, 19, 27, and 39-41 with little attrition rate (Schweinhart, 2003). The program focused on teaching children for two and a half hours on weekday mornings and one and a half hour home visits to each mother and child on weekday afternoons. The program's model was an open framework of educational ideas and practices based on the natural development of young children. Drawing on the child development ideas of Jean Piaget, the program emphasized the idea that children are intentional learners, who learn best from activities they plan, carry out, and review afterwards (Schweinhart, 2003).

In a study of the High/Scope Perry Preschool, a program designed for African American 3-4 year old children living in poverty, Luster and McAdoo (1996) used longitudinal data that span from when the participants were preschoolers to when the participants were 27 years old. They studied factors that contribute to individual differences in educational attainment. From their findings, Luster and McAdoo concluded the contributions that supported the preschool program's design were attributed to both

the individual child and the family. Through measures of cognitive ability and behavior inventories, academic motivation and personal behaviors were studied with a goal of exploring the developmental pathways of poor African American children from kindergarten to adulthood. The study reports that mothers who were rated by kindergarten teachers as being more involved tended to have children who were rated as being relatively competent, motivated, and well adjusted in kindergarten.

The evidence was mixed to support the hypothesis that families who were more involved in school would have children who were more successful students. Researchers concluded that parents may affect their children's educational outcomes more by what they do in the home than by the amount of time they spend in the schools. Case studies of the participants at age 19 suggested that more successful students tended to have parents who placed a high value on education. Children's characteristics assessed as early as kindergarten (cognitive competence and academic motivation) were found to be predictive of educational outcomes in adulthood. Though the families in this study were of low socio-economic status (SES), many parents helped their children to overcome obstacles associated with low SES and to obtain higher levels of education than they had achieved themselves (Luster and McAdoo, 1996).

Chicago Child-Parent Centers

In 1967, four Chicago Child-Parent Centers were established through federal government Title I funds for economically and educationally disadvantaged children. The program provides half-day pre-school, full-day kindergarten, and all day services in the follow-on program in grades one through three. The program provides up to six years of comprehensive services (nutrition and health, teacher training, teacher assistants) parental

involvement, emphasis on reading, and mathematics (Ou, 2005; Reynolds & Temple, 1998; Reynolds, Temple, & Ou, 2003). Reynolds and Temple's (1998) study of the Chicago Child-Parent Centers indicates extraordinary results for the low-income children who continued to participate in the program through second and third grades. The success of this extension feature of the program is supported by the provision of funds for teachers to purchase instructional materials and supplies, smaller class sizes, the participation of parents as volunteers, parent programs, and a parent information room.

Reynolds, Temple, and Ou (2003) report that parents attended general equivalency diploma classes (GED) which contributed an enhanced the quality of post-program school and community environments. Collaborative efforts between the teachers and the parents as a part of the follow-on feature of the Chicago Child-Parent Centers yielded significantly higher reading achievement scores for the participants at age 13. Additionally, children in the follow-on program were significantly less likely to be retained by eighth grade and were less likely to receive special education services. These students academically outperformed the children who ended their program participation in kindergarten. Extended program participation was also linked to higher rates of high school graduation or GED acquisition and greater educational attainment by age 21 (Reynolds Temple, & Ou, 2003; Ou, 2005).

Carolina Abecedarian Project

Studies of the Carolina Abecedarian Project by Campbell et al. (2001), Campbell and Pungello (2000) and Campbell and Ramey (1995) describe the long-term outcomes observed for low-income African American participants. The four cohorts of children for this project were born between 1972 and 1977. In this program, the children received

educational interventions provided in a full-time child care setting year-round for five years beginning in infancy. The children received pediatric care and educational support through the first three years in elementary school. Supporting this effort was the provision of a series of informative programs on parenting topics identified through a survey of their interests. Parents also participated as members of the day care center's advisory board. Campbell and Ramey's (1995) study concluded that the program captivated the optimal time to implement the early interventions, which was during the preschool years. School-age support was also provided, which included interventions designed to support the children's academic development by increasing and enhancing parent involvement in the education process.

Each family was assigned a home/school resource teacher (HST) for the first three years their child attended public school. The HST provided parents with home curriculum activities individually designed for each child to reinforce the basic reading and mathematics concepts being taught at school. The supplemental activities were customized based on the classroom teacher's input about the concepts and skills the child was learning. Every other week, the HST delivered new learning activities to the home where explanations and demonstrations were provided to the parents. The parents were urged to use these activities for at least 15 minutes each day and were given calendars to document completion. Children earned books for completing activities.

These fortified support efforts resulted in the children showing patterns of intellectual development through adolescence and significance difference in test performance for mathematics and reading maintenance for ten years, lower special education placements and lower retentions (Campbell & Ramey, 1995). Later studies by

these authors revealed that these outcomes were sustained through high school, and the participants showed significantly higher scores on cognitive tests at age 21 (Campbell, et al., 2001; Campbell & Pungello, 2000).

Head Start

Over forty years ago, in 1965, the pioneering Head Start program was designed without the benefit of the scientific research that is reliably used today to develop educational programs. The principles of the Head Start program were designed largely by means of intuition, with the program's architects demonstrating an awareness of all the "sensory" influences on both the social and intellectual growth of young children; these developers also knew that the family must provide most of these experiences (Lewis, 2003). Sargent Shriver, director of the Office Economic Opportunity at the time, envisioned a summer school and pre-kindergarten for poor children that would advance underprivileged three and four olds to a level of educational readiness on par with their middle-class counterparts; while providing their families with health services, job training, and other resources (Aughinbaugh, 2001; Terezakis, 2001).

Lewis (2003) asserts that Head Start was designed to rely on the creation of good feelings between parents and the programs so that children would have better chances to succeed in school. Terezakis (2001) contends that the founders of Head Start believed that success was only possible by involving parents in the program and that the continued positive development of the children would be ensured by the impact of the involvement on the parents themselves. The nature of parent participation became a matter of debate between those who thought parents needed to acquire childcare and homemaking skills and those who thought they should be equal partners in the administration of the

program. Though policy manuals heavily emphasized parent involvement, there was vagueness as to the ways in which they might actually become involved (Terezakis, 2001).

During the first summer of Head Start programming, two thousand centers serving more than five thousand children were established (Terezakis, 2001). Since its inception, Head Start has enrolled over 21,000,000 individuals; in 2004, more than 900,000 three- and four-years olds were enrolled in half or full day programs for eight or nine months a year with approximately 25% of the programs in operation being full-day, year-round programs (DHHS, 2003). Four years after the inception of Head Start, the Department of Health, Education, and Welfare (now the Department of Health and Human Services) took over the program's implementation and direct funding of its operation. From 1964 to 2004, taxpayers spent $66,000,000,000 on Head Start, funding the 2004 programs for $6,600,000,000, averaging approximately $7,000 per pupil enrolled (DHHS, 2003). Likewise, Terezakis (2004) concludes that Head Start's funding has tripled from 1994 to 2004; yet, Head Start centers only have the resources to serve 20 to 40 percent of eligible children in a given community. Even more devastating according to Terezakis, the U.S. General Accounting Office reports the inability of Head Start centers to find health professionals and facilities at affordable costs or to retain qualified teachers due to low annual salaries. Moreover, Head Start centers have opted to neglect parent outreach, educational seminars, and family related services in favor of admitting as many children as centers can; using volunteer efforts and engaging parents for chores that require no training. These constraints significantly comprise the comprehensive nature of the original design of Head Start programs.

Concerns regarding the dollar value of Head Start's effectiveness in assuring children are prepared to succeed in school has resulted in a scrutinizing look at the academic gains and increased IQ scores for the children enrolled (Aughinbough, 2001; DHHS, 2003; Lewis, 2003). The 1998 Head Start reauthorization act included the conducting of an impact study that would begin in 2002 and end in 2006 to determine whether or not Head Start participants have improved cognitive, social, and emotional development; increased communication and motor skills; and improved health when compared to non-participants (DHHS, 2003). A 2003 report from the Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Services (DHHS), reveals limited educational progress for children in Head Start, problems resulting from a fragmented approach to early childhood services, most children enter and leave Head Start with below-average skills and knowledge levels, and that disadvantage children lag behind their more affluent peers throughout the school years.

Information provided from the 2000 Family and Child Experiences Survey (FACES) in the DHHS (2003) report shows modest improvement in results for children, but the overall progress is still too limited. The children continue to lag behind the national norms when they exit Head Start. Data from Head Start FACES 2000 show:

- letter-recognition is far below the majority of U.S. children who know all of the alphabets upon entering kindergarten; Spanish-speaking children in Head Start did not gain at all in letter recognition skills
- although writing scores increased 2 points during the 2000 Head Start year, this was a drop from the 1997 group who increased 3.8 points

- scores for vocabulary were at about the 16th percentile (about 34 percentile points below the average), scores for letter recognition were at about the 31st percentile, and scores for early mathematics were at about the 21st percentile
- mathematics scores showed statistically significant progress, however the difference was small for 87.9 to 89.0 on a scale for which 100 is the average

It is believed by some that Head Start remains at the center of an age-old debate over whether it is appropriate to teach young children academic skills, contending that Head Start favors the Piagetians philosophy of play activities for preschoolers over instruction and mastery of skills. While some believe that it is harmful to a youngster's development to teach pre-literacy, pre-math, and other school readiness skills, others contend that children are ready and eager to learn; furthermore, they argue that poor children need these skills prior to going to kindergarten being that their middle-class peers usually possess these skills (DHHS, 2003; Van Horn & Ramey, 2003). According to the 2003 DHHS report, research indicates acquiring specific pre-reading, language, and social skills strongly predict future success. Edward Zigler, a strong proponent of Head Start, offers a "snowball hypothesis" which postulates that children who have certain experiences at age four begin kindergarten in a better position to learn. He further states that if the kindergarten teacher interacts with the child in an engaging and positive manner, the child goes on to the next grade even better prepared (Lascarides & Hinitz, 2000).

The Impact of Kindergarten

There is much controversy and debate regarding many of the aspects of kindergarten, such as the length of the day, compulsory attendance, age of entry, class

size, screening, teacher qualification, and curriculum and instructional methods. However, there is general consensus that kindergarten is the place where young children begin to integrate cognitive, social, and physical competences. Howes (2003) espouses that kindergarten environments that optimally support the emergence of social, emotional, and cognitive competencies will benefit children in later years.

Later Outcomes of Kindergarten

Vecchiotti (2001) asserts children's kindergarten experiences yield a major impact on their subsequent learning and school success. According to Lascarides and Hinitz (2000), as kindergarten evolved in the school reform movement, it was hoped that kindergarten would be a solution to a number of national social issues such as the advancement of African Americans, the acculturation of Native Americans, the assimilation of immigrant populations and the alleviation of inner-city social problems. Today, it is believed that preparing all students to be "ready to learn" by first grade will help to reduce the achievement gap between groups of children (Plucker, Eaton, Rapp, Lim, Nowak, Hansen, et al. 2004). To this end, an interest in expanding kindergarten from a half-day program to a full-day emerged to better prepare children for elementary school through the use of a more formal curriculum (Wortham, 2002). Participation in full-school-day kindergarten, as compared to half-day, results in higher academic achievement in reading and mathematics; and it promotes good relationships with peers and teachers (Vecchiotti, 2001).

Half-day and Full-day Kindergarten Programs

In the 1980s and 1990s, a move from half-day kindergarten to full-day kindergarten received much consideration. What constitutes a full-day or a half-day program varies across states ranging from two to six hours for full-day and from two to four hours for half-day programs (CCSSO, 2000). Full day programs provide opportunities for students to be more actively engaged and for teachers to provide enhanced instruction. Additional hours daily in kindergarten has proven to be advantageous for all children, not just children from families with low incomes (Clark and Kirk, 2000). However, low SES students and students judged to be at risk evidenced greater gains than middle or high SES students in literacy, math, general learning skills, and social skill (Finn, 2000).

According to Snyder and Hoffman (2001), research indicates that children who participate in full-school-day programs spend more time engaged in self-directed, independent learning and dramatic play; experience less frustration since there is more time for them to develop their interests; and are exposed to science, social studies, art, music, and physical education which are included more often than in half-day programs. Children in full-day programs demonstrate more positive behavior in the areas of originality, independent learning, and involvement in classroom activities and have fewer grade retentions (Cryan, Sheehan, Wiechel, & Bandy-Heddan 1992).

Elicker and Mathur (1997) report that teachers in full-day programs are afforded more time to pace instruction according to children's needs; extend learning experiences; explore instructional topics in depth; accommodate more teacher-directed individual work with students; develop more positive and nurturing relationships with students; and

develop close parent-teacher relationships. Full-day schedules allow for more appropriate challenges for students at all developmental levels and enable teachers to use more developmentally appropriate practices in their classrooms. Although some stakeholders advocate for half-day programs, no detrimental effects of developmentally appropriate full-day kindergartens were found when compared to half-day kindergartens (Martinez & Snider, 2001).

In a national longitudinal study with a sample of 22,000 kindergarteners representing diverse racial, ethnic, and socio-economic status, Walston and West (2004) report that children in full-day kindergarten made greater gains in reading, language arts, and math over the course of the year compared to those enrolled in half-day kindergarten. Hough and Bryde (1996) report from their research that students who attend full-day kindergarten experience a wider range of benefits than their half-day counterparts with scientific evidence favoring full-day kindergarten on virtually every dimension. Both parents and teachers expressed an overwhelming favor for full-day kindergarten, stating improved learning and school socialization skills for the children. However, the long-term benefits of full-day kindergarten are mixed (Finn & Pannozzo, 2004).

Conclusion

The evolution of early childhood education programming is greatly influenced by ideas, philosophies, and theories that have served as the bedrock for the field. Across the eras of times, philosophers, theorists, researchers, policymakers and educators have consistently focused on the intellectual and social growth of youngsters – each striving to make the desired difference to improve the field of early childhood education. Throughout, appeals to the social consciousness of policy makers have summoned them

to hear the call for educational reform and respond accordingly. These calls can still be heard today. Moreover, scholars such as Woodson (1933), Gordon (2001), and Gandara (2004) have made earnest appeals to the educational enterprise for decades to advance the learning of all students, especially those who are underrepresented among the high achievers.

Research and perspectives on curriculum, instruction, pedagogy, brain-based learning, socio-culture and diversity have contributed to current early childhood practices. A renaissance for future early childhood education programs is inevitable as school districts across the nation seek to find solutions to the persistent need to prepare students in pluralistic kindergartens to be ready for formal school, life long learning, and to make meaningful contributions to society. Among these solutions are the use of research-based content curricula and increasing the intensity and amount of children's exposure to preschool and kindergarten educational experiences. The early childhood education policy adopted by the District selected for this study consists of a reform initiative that includes full-day kindergarten and a revised curriculum.

As discussed in this review of the literature, the use of a planned curriculum and specifically designed learning materials date back to the features of Froebel's first kindergarten (Froebel, 1902). Bruner's realization that content subjects can be taught with integrity as early as in the kindergarten year transformed the thinking of educators and assisted the development of program curriculum (Brewer, 2001; Kaplan-Sanoff & Yablans-Magid, 1981; Lascarides & Hinitz, 2000). This thinking, coupled with Jensen's belief that intelligence is mutable and that all students benefit from enrichment, has unleashed new perspectives for educating students of color and those living in poverty

(Gardner & Checkley, 1997; Riley, 2003; Wilen, 2003). Hence, students living in urban areas and those with low socio-economic status are afforded access to opportunities for accelerated learning – this is the goal of the district's early childhood education reform initiative selected for this study. If the aim is for all students to become meaningful contributing members of society and to be life-long learners, it is imperative that research focuses on the impact of *early years* reform efforts to support and foster *long-lasting* high achievement.

Chapter 3: Methodology

Chapter Two discussed the need to research reform initiatives that are designed to accelerate academic achievement for students attending urban schools. Chapter 3 will present the research questions, district and policy information, the research site, data gathered, methods of data analysis, and limitations to the research. The previous discussion warrants an investigation of the placement and participation of low-income urban students in advanced classes. To that end, this research seeks to discover:

1. How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of second grade students?
2. How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of fifth grade students?
3. How has the achievement gap narrowed between students in Title I schools who participated in the Early Childhood Intervention Program (ECIP) and non-Title I students who did not participate in the program?
4. How does participation in the Early Childhood Intervention Program (ECIP) influence whether sixth grade students receive advanced mathematics placement and experience special education placement?

The District

The school district selected for this study is one of the largest and most diverse school districts in the nation. It is a large urban/suburban district located in a Mid-

Atlantic state, and is referred to as "the District" for this study. The District is one the 20 largest school districts in the country and the largest district in the state. Its population is extremely diverse socio-economically, culturally, and linguistically. It enrolls students from 163 different countries that speak more than 100 different languages. The District has some of the highest performing schools located in some of the wealthiest neighborhoods in the nation. Its metropolitan location is attracting a growing immigrant population as well as increasing numbers of low-income families. Hence, a heavy concentration of Latino and African American students populate an urbanized core that runs through the center of the county.

As discussed in Chapter One, the district for this study is composed of an inner urban core and a suburban outer ring which affords the opportunity to examine academic achievement relative to the distribution of racial groups and wealth. In 2004, the District reported a total enrollment of 67,129 students in the high-poverty inner corridor with 75% minority, 37% receiving free and reduced priced meals, and 14% with English as a second language. Conversely, in the outer ring where the families are more affluent, the student enrollment of 72,944 has only 38% minority, 9% receiving free and reduced priced meals, and 5% with English as a second language. The District has 129 elementary schools in the combined urban and suburban areas.

The District is experiencing rapid demographic changes which are reflected in its achievement assessment scores. To keep the school system from becoming a district divided in two by socio-economic status, the District's Board of Education adopted an early childhood education policy to implement the *Early Childhood Intervention Program*. During the 2000-2001 school year, this program was initiated in the 17 Title I

elementary schools with the highest need. The Board of Education decided on this deliberate action to reduce the disparities in school performance between schools in wealthy neighborhoods and schools in areas with greater educational and socioeconomic needs. Starting in the urbanized core, the program was implemented in additional schools each year to meet the needs of all of the students in the District from the high achievers to those at risk of school failure. For these reasons, the District was selected for this study. Moreover, the research findings discussed in Chapter One and the viability of socioeconomic cohort selection made this district a premier site for the purpose of this study, academic achievement and advanced class placement for racial and ethnic groups.

Policy Specificity

In the fall of 1999, the District's superintendent requested and the Board of Education approved a complete redesign of the kindergarten program. The approved policy package added additional resources to support full-day kindergarten in the 17 highest need schools. These high-needs school received full-day kindergarten for the 2000-2001 school year, increasing the length of the school day from 2.5 hours to 6.25 hours. The schools also received a reduction in class size from approximately 28 students to a 15:1student-teacher ratio. In an effort to establish and implement a rigorous and accelerated kindergarten program, a multi-year staff development plan for 360 teachers was designed. For the fiscal year 2001, 40 additional teacher positions were added. Also included in the resource program policy package was the purchase of instructional materials (balanced literacy and mathematics) for kindergarten teachers and assessment tools to acquire in-depth and continuous information on student progress. Additionally, documents were prepared and disseminated to all kindergarten parents.

This early childhood education reform initiative was the results of research conducted on the District's students and curriculum, which identified a major concern of critical significance – gaps in achievement and opportunity. The District's internal study of its graduates revealed that students who were not performing on grade level by Grade 3 had little chance of preparing for rigorous high school courses. Further, a curriculum audit conducted by an external evaluator revealed variability in curriculum implementation; a lack of curriculum alignment; a lack of curriculum-based diagnostic assessments; disparity among textbooks and instructional materials; a gap in achievement between minority and non-minority students; and a lack of coherent curriculum policy.

In light of these findings, and the District's knowledge of the research that supports early interventions, the Early Childhood Education Policy is designed to address the inequity of opportunities for many of the District's low-performing students. Based on the belief that every child can succeed if given a strong start, the District made the commitment to raise the bar and widen the opportunities to learn for its youngest learners. Committing to the academic success of the increasing numbers of students who were starting school with greater needs related to poverty, language development, and disability, the Board of Education adopted an overarching curriculum policy.

The curriculum policy calls for a clear and coherent written curriculum in the form of a set of objectives derived from local, sate, national, and international standards. These standards ensure the rigor and challenge required by students to successfully complete Honors and Advanced Placement courses. Moreover, the policy encompasses all facets of curriculum design and revision, including staff development and monitoring. The primary stakeholders for the policy are: the District's superintendent (vision and

leadership); the District Board of Education (goal development); the District personnel (professional development, implementation, and monitoring); and community, business agencies, and parents (collaborative partnerships).

Early Childhood Reform

The District initiated curriculum revisions first in kindergarten. Since many students were entering school without the necessary foundational literacy skills, the District conducted an internal kindergarten study in 1999. This study documented the need to increase the rigor of the program and provide a differentiated instructional design for half-day and full-day programs. It was determined that students entering school academically behind their peers need to have access to a rigorous and challenging curriculum and to be held accountable to the same high standards as their non-impacted peers. Over a period of three years, the pre-kindergarten through second grade reform, the *Early Childhood Intervention Program* (ECIP), increased the number of full-day kindergartens from 17 to 56. As previously stated, the *ECIP* began with a new kindergarten initiative that was implemented during the 2000-2001 school year.

The *Early Childhood Intervention Program* is a comprehensive early education reform that features full-day kindergarten and an enrichment program that incorporates some of the latest research on brain development research, curriculum, instruction, assessments, and professional development. Specifically, the *ECIP* includes these independent and congruent components: a) standards-based curriculum; b) professional development; c) diagnostic assessment; d) more instructional time; e) extended learning opportunities; f) smaller classes; e) parent involvement; f) policies and governance; and g) instructional management system.

Full Continuum of Services

In addition to offering full-day kindergarten, The *Early Childhood Intervention Program* includes a full continuum of services. Students who participate in full-day kindergarten will have opportunities to accelerate and enhance their learning experiences. The full-day program will provide students with more reading, writing, and mathematics instructional time, as well as more time to explore interdisciplinary units (Appendix B). The full-day program offers a total of 6.25 hours of schooling, while the half-day program offers 2.5 hours. This is an additional 3.75 hours of school time. The *ECIP* also includes the following components in its full continuum of services:

Standards-based curriculum – a revised standards-based curriculum with precise expectations of what students should learn and be able to do; instructional guides containing pre- and post assessments; core-instructional materials; and textbooks.

Professional development – all teachers receive professional development on the revised curriculum, strategies, assessment, and data management; additionally, teams of teachers, principals, and instructional assistants from schools were trained in the revised mathematics and reading/language arts curriculum.

Diagnostic assessments – all students were assessed periodically during the year, which allowed teachers to make adjustments in the instruction for each individual student; the progress of each student was closely monitored through a technology-based system.

More instructional time – full-day kindergarten programs were phased into 56 of the most-highly impacted schools over a three-year period with extended time for balanced literacy and mathematics.

Extended learning opportunities – extended-day and extended-year programs were provided for students in the most highly-impacted schools.

Smaller class size – class size was reduced to 15:1 in the full-day kindergarten program.

Parent involvement – increased communication with parents through grade-level curriculum documents that communicate the expectations of the revised curriculum; a redesigned family-friendly report card that is aligned with the curriculum; home activities to support the instruction.

Policies and governance – revised Board of Education policies that align grading and reporting practices with curriculum, instruction, and assessment; a Board of Education adopted accountability system that established measures and targets for school performance.

The District acknowledges that raising the achievement for all students and closing gaps by race and ethnicity are not simple problems with easy answers. The *Early Childhood Intervention Program* targets kindergarten as the gateway to elementary school and begins the incremental improvement of what children are expected to know and be able to do in each subsequent grade level. The District attempts to meet these challenges by reengineering the needed work to do collaboratively through an accountability process that is based on facts and data; and by employing the very best thinking, teaching, learning, programs, partnerships, and professional development.

To evaluate the integrity of the District's curriculum frameworks for mathematics and English, an external review was done in 2003. The evaluation determined the frameworks were rigorous and reasonable and could be on par with the best in the nation and world if they were strengthened in several key areas. The frameworks were found to

contain the core knowledge and skills of high-quality curriculum guides. The District's Early Childhood Education Policy requires a policy review every three years in accordance with the Board of Education policy review process.

Reform Evaluations

District evaluations of the *Early Childhood Intervention Program* for the 2000-2001 full continuum kindergarten participants reveal positive benefits overall. According to the District, the first three years of a longitudinal study of 16,000 students found that poor and middle-class children in full-day kindergarten programs in high-poverty schools outperformed wealthier children in schools with half-day kindergarten programs without the full continuum reform interventions. The District further reported the highest need students not only increased their foundational reading skills in kindergarten, but they also sustained their achievement in reading in Grade 1. Further study of the first 17 highest-need schools to receive the full continuum of the intervention indicates improvements for Grade 2 on the CTBS, a nationally normed achievement test, compared to the performance of previous Grade 2 students. These first intervention students show continued improvement on the District Assessment Program. Again, the improvements for the Grade 2 class were significantly greater in the high-poverty intervention schools when compared to schools in wealthier areas. Findings from the District's 2003 longitudinal evaluation of the impact of early childhood initiatives on student academic achievement also conclude high levels of performance on the CTBS. This longitudinal evaluation examined the performance patterns of students of various racial/ethnic groups through second grade. Students from all racial/ethnic groups were more likely to perform at or above the national median on the CTBS in reading if they participated in a full-day

kindergarten program and remained in the same school for kindergarten, first grade, and second grade.

According to the District's internal evaluation reports, the positive effects of the intervention strategies associated with the program include a reduction in achievement disparities between students of color, low-income students, and English language learners, and White students. Students in the 17 highest-need schools that were the first to receive the reform intervention indicate higher levels of proficiency on state criterion-referenced benchmark assessments, state nationally normed-referenced assessments, and the nationally-normed Comprehensive Test of Basic Skills (CTBS). According to the District's superintendent, intervention program participants from all racial and ethnic groups are achieving at higher levels in kindergarten and sustaining their performance through Grade 2 as indicated on the Comprehensive Test of Basic Skills (CTBS) composite scores for the same cohort of students from kindergarten to Grade 2.

The data in figure 3.1 highlight the progress of the first cohort of students to receive the intervention reform initiative. Figure 3.1 reflects the continued gains in student proficiency over time on different state and national assessment measures. It demonstrates continuous increase in academic scores on the CTBS and the State Assessments from 2001-2005.

Figure 3.1: Percentage of Students At or Above Reading Benchmark Proficiency

Progress of Cohort 1 Highlighted
Percentage of students at or above standard

	2001	2002	2003	2004	2005
Grade 4 (DSA)				82	86
Grade 3 (DSA)			67	78	79
Grade 2 (CTBS)	64	64	64	73	73
Grade 1		60	62	74	n/a
Kindergarten	39	59	68	71	n/a

District, 2005

Figure 3.1 indicates a baseline reading proficiency level of 39% for the kindergarten class of 2001students who were at or above the national standards for reading. In each subsequent year, the number of students in that first kindergarten cohort meeting benchmark performance improved as they progressed to Grade 1 with 60% proficient, Grade 2 with 64%, and Grade 3 with 78%. By Grade 4, 86% of the students in the first cohort to receive the reform intervention were at or above standard on nationally normed State Assessments. It is also noteworthy that the second group of kindergarten students to receive the intervention in 2001-2002 demonstrated a 59% baseline, surpassing the first cohort and showing similar progress to the first cohort until grade three.

Figure 3.2: Second Grade CTBS At or Above the National Average

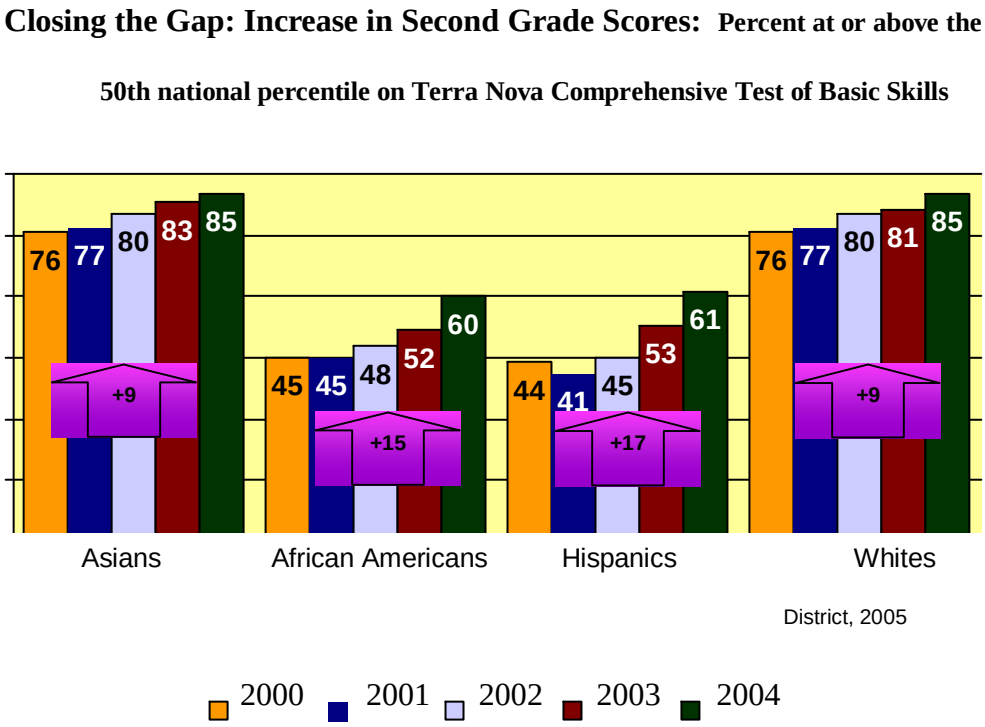


Figure 3.2 shows a steady increase in second grade scores for Asians and Whites over a five-year period. Over the course of this period, African Americans and Hispanics demonstrate the greatest amount of growth from 2000 to 2004. The first two years (2000 and 2001) show little to no growth for African Americans and Hispanics students. In fact, Hispanic students demonstrated a decline in scores in 2001. However, by the third year (2002), both African Americans and Hispanics show an increase in scores that continues until 2004. By 2004, African Americans and Hispanics demonstrate significant progress since 2001. The achievement disparities between these ethnic groups (African Americans and Hispanics) narrowed between Whites and Asians according to second grade CTBS scores at or above the national average of 50th percentile.

Research Design

To explore the research questions for this study, a longitudinal quasi-experimental time-lag cohort design that is descriptive in nature is used. Researchers often use a time-lag design to investigate cohort differences over time (Sugarman, 2002). A time-lag study compares two or more samples of the same chronological age but measured at different calendar times (Schaie, 1967; Schaie, 1972); albeit they reach that age at different times (Sugarman, 2002). Since descriptive studies have greatly increased the awareness and knowledge about what happens in schools; the intent of some descriptive research is to produce statistical information about aspects of education that is of interest to policy makers and educators (Gall, Gall, & Borg, 2003). Descriptive research is a type of quantitative research that involves making careful descriptions of educational phenomena and is primarily concerned with determining "what is." Descriptive research often employs the use of Standardized achievement tests.

This longitudinal time-lag cohort study follows nine cohorts of kindergarten students through the elementary school years until enrollment in grade six. Achievement measures at grade two with a national norm-referenced assessment and at grade five with a national norm-referenced and state criterion-referenced assessment were taken. The study further examines the cohorts at grades two, five, and six for academic placement in special education and enrollment in an advanced mathematics classes at grade six. This cohort study involves collecting and analyzing quantitative data to describe changes or continuity in academic achievement and placement from the sample groups. Comparisons of the academic achievement and placement between students who attend Title I schools in the urbanized core and those who attend Title I schools in the suburban outer ring are

made. In addition, comparisons between students who attend Title I schools in the urbanized core and those who attend non-Title I schools in the suburban outer ring are made. Comparisons of students attending the Title I schools within the urban core over time are made as well.

Research Site Access

An initial meeting with the Director of Early Childhood Programs for the District occurred to discuss research opportunities and to informally request access to the setting. Several follow-up meetings also occurred with the Director to discuss the specific details of the research project. With the full support of the Director, the District officially granted written approval to collect data and conduct the research study. To ascertain ethical research procedures and anonymity, data files produced by the District for this project contain pseudo identification codes for the students and the schools. Additionally, the University of Maryland granted an approved Institutional Review Board request prior to the initiation of the research project. The researcher will provide a written report of the findings from this study to the District.

Data Collection

The unit of analysis for this study is the student. This study examines drill-downed academic achievement and placement data at the student level to allow for a finer-grained analysis of the academic performance distribution for students who participated in the *Early Childhood Intervention Program*. The data collected reflect the differences between the students who received the intervention and those who did not at several data points. Previous studies examined the data at the school level. This study

disaggregates student data and follows student performance beyond the initial year of the program's implementation.

Sample

This study employs purposive sampling. Purposive sampling is a type of non-probability sampling which is characterized by the use of judgment and a deliberate effort to obtain representative samples by including typical areas or groups in the sample (Kerlinger, 1992). With this type of sampling, the sample is "hand-picked" for the research study. To select the schools within the two different areas of the district, the urbanized core and the outer ring, the socio-economic status (Free and Reduced-priced Meals (FARMS)) and the Title I status of the schools are the key considerations.

Table 3.1: Study Sample Intervention Cohort

Highest Need Title I (HNTI)	
Cohort	Description
FARMS 42-87%	17 Schools
Year 0 (HNTI-Y_0) 1999-2000	*Pre-policy Pre-intervention Title I Non-Intervention/ Comparison:* Kindergarten students enrolled in the initial 17 highest need, urbanized core, Title I schools prior to the full continuum intervention implementation
Year 1 (HNTI-Y_1) 2000-2001	*First Phase Title I Intervention:* Kindergarten students enrolled in the initial 17 highest need, urbanized core, Title I schools implementing the full continuum intervention for the first time
Year 2 (HNTI-Y_2) 2001-2002	*Second Year Intervention:* Kindergarten students enrolled in the initial 17 highest need, urbanized core, Title I schools the second year of the full continuum intervention implementation

Table 3.2: Study Sample Comparison Cohorts

Moderate Need Non-Title I (MNTI)	
Cohort	Description
FARMS 20-40% Year 0 (MNTI-Y_0) - 1999-2000 Year 1 (MNTI-Y_1) - 2000-2001 Year 2 (MNTI-Y_2) - 2001-2002	9 Schools *Non-intervention Title I Comparison:* Kindergarten students enrolled in the outer ring suburban schools identified as Title I schools not implementing the full continuum intervention
Low Need Non-Title I (LNNTI)	
Cohort	Description
FARMS 5-20% Year 0 (LNNTI-Y_0) - 1999-2000 Year 1 (LNNTI-Y_1) - 2000-2001 Year 2 (LNNTI-Y_2) - 2001-2002	9 Schools *Non-Intervention Non-Title I Comparison:* Kindergarten students enrolled in the outer ring suburban schools identified as non-Title I schools not implementing the full continuum intervention

The sample for this study consists of nine cohort groups of students. As indicated in Tables 3.1 and 3.2, the cohort groups are: the *Highest Need Title I* (HNTI) with a 42-87% FARM rate, the *Moderate Need Title I* (MNTI) with a 20-40% FARMS rate, and the *Low Need Non-Title* I (LNNTI) a with 5-20% FARMS rate. The *HNTI* cohorts are the intervention cohorts and the *MNTI* and *LNTI* cohorts are the comparison cohorts. The nine cohort groups represent the three kindergarten years under study. The *HNTI* cohorts consist of the initial 17 schools to receive the reform initiative. The two comparison cohorts consist of nine schools each.

To assure the comparison cohorts (*MNTI* and *LNNTI*) represented an even distribution within the decided FARMS ranges, a further breakdown within the broad rages occurred. For the broad 20-40% FARMS range of the *MNTI* cohorts, three schools each between the ranges of 20-26%, 27-33%, and 33-40% FARMS were selected. Likewise, the broad 5-20% FARMS range of the *LNNTI* cohorts include three schools each between the ranges of 5-10%, 10-15%, and 15-20% FARMS.

For sample selection, it was critical to consider when each school would experience the full continuum of the intervention to ensure students who attended the comparison schools would not experience the full reform effort during the years of the study since new schools were phased in each year. The 1999-2000 school year, the year prior to the full continuum intervention implementation, is indicated as Year 0 (Y_0) in Tables 3.1 and 3.2. Likewise, the 2000-2001 school year, the first year the full continuum intervention was implemented in kindergarten, is indicated as Year 1 (Y_1). The 2001-2002 school year, second the full continuum intervention was implemented, is indicated as Year 2 (Y_2). Because the first year of an intervention is often considered a lean year, the second year of the intervention is also included in this study.

The *Highest Need Title I* Year 1 (HNTI-Y_1) cohort is the first intervention group of the *Highest Need Title I* cohort. As indicated in Table 3.1, the *HNTI-Y_1* is comprised of the first group of kindergarten students to receive the full continuum implementation of the *Early Childhood Intervention Program* in the 2000-2001 school year. This cohort group of kindergarteners were enrolled in the initial 17 highest-need Title I elementary schools in the urbanized core of the county with a free and reduced-priced meals (FARMS) percentage rate of 42.9-86%. This cohort and the *Highest Need Title I* Year 2

(HNTI-Y_2) cohort are the intervention groups for this study. The *HNTI-Y_2* is the second group of kindergarten students who attended the initial 17 schools in the 2001-2002 school year. These kindergarteners also received the full continuum intervention program and had a 42-87% FARMS rate. The other cohort of kindergarten students from the 17 highest-need Title I schools serve as a comparison group. The *Highest Need Title I* Year 0 (HNTI-Y_0) cohort includes the kindergarten students who attended these 17 schools in the 1999-2000 school year, prior to the full implementation of the intervention. Thus, the HNTI-Y_0 cohort did not receive the intervention. However, nine of the schools received full day kindergarten but not the revised curriculum and the full continuum of services. The reform imitative was not implemented until the 2000-2001 school year.

Table 3.2 shows the cohort groups that serve as comparison groups for this study. These cohort groups consist of students who attended elementary schools located in the outer ring of the county with a moderate to low percentage of students who received free and reduced-priced meals. These cohorts had half-day kindergarten programs and did not receive the full continuum reform program. The *Moderate Need Title I* (MNTI) cohorts consists of students attending Title I schools with a 20-40% FARMS rate. These cohort groups are identified by kindergarten year as well to keep comparisons parallel. The other comparison cohorts, the *Low Need Non-Title I* (LNNTI) cohorts, are comprised of students who attended schools in the outer ring of the county not identified as Title I schools with a 5-20% FARMS rate. Like the other cohort groups, the *LNNTI* cohort groups correspond to the year the students entered kindergarten.

The District's policy was designed to accelerate the learning of those students who arrive to school substantially lagging behind their more affluent peers. For this

reason, it is essential to examine student achievement in the schools targeted for the intervention prior to the implementation of the *Early Childhood Intervention Program*. Further, examining the academic performance of students in the areas populated by families that are more affluent is critical to provide information on the policy's goal to reduce the racial achievement disparities that exist within the county. The intent of the sample selection is to review assessment performance outcomes as they relate to the District's policy goals to provide equitable educational opportunities to high-need students early and to narrow achievement disparities among racial groups in the school district.

Instrumentation

To answer the questions for this study, archival longitudinal data were collected seeking to describe changes in the characteristics of the sample over time. Academic achievement and placement assessment data were collected for the intervention and the comparison cohorts for grades two, five, and six. These data span the school years of 2001-2002 through 2007-2008. The data points included in this study are the Terra-Nova Comprehensive Test of Basic Skills (CTBS) grade two reading and mathematics scores; and the District School Assessment (DSA) grade five reading and mathematics. Other demographic (race/ethnicity, gender), English as a second language, free and reduced meals, and attendance data were also collected for the District. Data for English as a second language and free and reduced meals were reported at the kindergarten level. A data chart for this study is included in the appendices (Appendix C).

The CTBS is a component of the TerraNova series of assessment, published by CTB/McGraw-Hill. The TerraNova was normed in 1996. The CTBS Survey and Survey

editions of the CTBS have been administered in Grade 2 through the District's state since 1999-2000 as part of the state's assessment program. All of the items in these editions are selected-response items. The District School Assessment (DSA) provides national norm-referenced and state criterion-referenced data. The norm-referenced items provide national percentile ranks to describe how well a student performed in reading and mathematics compared to his/her peers nationally. The criterion-referenced items provide proficiency benchmark scores (expressed as Basic, Proficient, or Advanced proficiency levels) to describe how well a student has mastered the reading and mathematics content specified in the State Content Standards.

Data Analysis

The questions for this study were answered through the compilation and analysis of descriptive statistics and other quantitative data analysis procedures. The SPSS software program was used for all statistical calculations. To describe the sample as a whole, variables were defined and measured; and for each measure, one or more descriptive statistic measures of central tendency (mean, median, and mode), and measures of variability (standard deviation, variance, and range) were computed. Derived scores (percentiles and standard scores) were calculated to aid in interpreting the data on the variables that were measured (Gall, Gall, & Borg, 2003; Glatthorn, 1998). Basic counts and percentages were used to describe the percentage of students at different benchmark performance levels and their scores on national and state assessments. Benchmark performance levels were collected at given years and selected grade levels. These data were analyzed within and across cohort designation.

Quantitative statistical analyses were used for comparisons and relationships between the Title I cohorts that received the intervention and the Title I and non-Title I cohorts of students who did not receive the intervention, as well as the cohort of students who attended the same highest need Title I schools before the intervention. The *t* test was used to determine statistical significance of the comparisons made between the cohorts on the sample as a whole. Chi-square correlations were used for the binary placement data for special education and advanced mathematics. The One-way Analysis of Variance (ANOVA) was used to analyze the dependent variable by a single factor variable. Regression methodologies were used to help determine if other factors had a statistical bearing on placements by school, grade level, and cohort group. To make binary comparisons such as the probability of students' enrolled in advanced classes, logistic regression was used. Hierarchical regression was used for continuous variables with Grade 2 and Grade 5 reading and mathematics scale scores.

In this study, the data from the *Highest Need Title I* cohorts for years one and two served as the primary cohort data for which comparisons were made. The achievement and academic placement of students in the *HNTI* cohort prior to the invention, *HNTI-*Y_0, was compared to the *HNTI-*Y_1 cohort and the *HNTI-*Y_2 cohort. The *Highest Need Title I* cohort data were also compared to that of the students in the *Moderate Need Title I* cohort and the *Low Need Non-Title I* cohort at different years across grades 2, 5, and 6.

Question One

Question one addresses the achievement performance and academic placement of the students in the cohort groups at Grade 2. It entails a comparison of the Comprehensive Test of Basic Skills (CTBS) scores and special education placement for the students who participated in the full continuum implementation of the *Early Childhood Intervention Program* reform and those students who did not participate. Analyses were made across the years within the *Highest Need Title I* cohort and through comparisons with the *Moderate Need Title I* and *Low Need Non-Title I* cohorts to answer the question:

> *How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of second grade students?*

To answer question one, basic counts and percentages were used to describe the academic achievement at Grade 2. Analysis of variance comparing intervention Title I students (*HNTI-*Y_1 and *HNTI-*Y_2) to non-intervention Title I (*MNTI-*Y_1 and *MNTI-*Y_2) students to non-intervention non-Title I (*LNNTI-*Y_1 and *LNNTI-*Y_2) students at years one and two were done. Hierarchal regressions were done using CTBS reading and mathematics scale scores, continuous variables, and demographic and academic variables. Chi square was used for the binary data for special education placement.

Question Two

Question two addresses the achievement performance and academic placement of the students in the cohorts groups at Grade 5. It entails a comparison of the District State Assessment (DSA) scores and special education placement for the students who

participated in the full continuum implementation of the *Early Childhood Intervention Program* reform and those students who did not participate. The Grade 5 DSA scores were provided as both normed-referenced scores and criterion-referenced benchmark placement scores. Analyses were made across the years within the *Highest Need Title I* cohort and through comparisons with the *Moderate Need Title I* and *Low Need Non-Title I* cohorts to answer the question:

How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of fifth grade students?

To answer question two, basic counts and percentages were used to describe the academic achievement at Grade 5. Analysis of variance comparing intervention Title I students (HNTI-Y_1 and HNTI-Y_2) to non-intervention Title I (MNTI-Y_1 and MNTI-Y_2) students to non-intervention non-Title I (LNNTI-Y_1 and LNNTI-Y_2) students at years one and two were done. Hierarchical regressions were done using DSA reading and mathematics scale scores, continuous variables, and demographic and academic variables. Chi square was used for the binary data for special education placement.

Question Three

Question three addresses the achievement disparities among the cohort groups. It entails a comparison of the mathematics and reading achievement for the students who participated in the full continuum implementation of the *Early Childhood Intervention Program* reform and those students who did not participate. Analyses were made across the years comparing the *Highest Need Title I* cohorts with the *Moderate Need Title I* and *Low Need Non-Title I* cohorts to answer the question:

How has the achievement gap narrowed between students in Title I schools who participated in the Early Childhood Intervention Program (ECIP) and Non-Title I students who did not participate in the program?

To answer question three, basic counts and percentages were used to describe the academic achievement of the students in the cohort groups across the years and grade levels. The difference in the means of test scores for Grade 2 and Grade 5 were calculated to indicate disparities in achievement between the students in the *Lowest Need Title I* cohorts and the students in the *Moderate Need Title I* and *Low Need Non-Title* I cohorts.

Question Four

Question four addresses the placement status of students in an advanced mathematics class and special education class at Grade 6. It entails a comparison of class enrollment for the students who participated in the full continuum implementation of the *Early Childhood Intervention Program* reform and those students who did not participate. Analyses were made across the years within the *Highest Need Title I* cohorts and through comparisons with the *Moderate Need Title I* and *Low Need Non-Title I* cohorts to answer the question:

How does participation in the Early Childhood Intervention Program (ECIP) influence whether sixth grade students receive advanced mathematics placement and experience special education placement?

To answer question four, basic counts and percentages were used to describe the academic placement at Grade 6 comparing the non-intervention Title I schools with highest need (HNTI-Y_0) to Title I schools with moderate need (MNTI) to non-Title I

schools (LNNTI). Logistic regression was conducted with binary placement data for advanced mathematics classes. A Chi square analysis was also conducted.

Limitations

In non-experimental studies, there is no real control of the actual events that influence what is being studied. Any research study may be vulnerable to researcher bias with the researcher's expectations about what will occur being unintentionally transmitted to the findings and outcomes. The researcher's expectations could also influence data collection, data analysis, and interpretation.

A Hierarchical Linear Model (HLM) research design would have been appropriate for this study. Because of the sophistication of this research technique, it was best for this researcher to analyze the data set using other regressions. The composition of the data set for this study is troublesome. Though comparisons can be made across the data points at grade two and at grade five, comparisons cannot be made between grade two and grade five. The grade two and grade five assessments scores are from two different assessments with different scale scores, which does not allow for grade level to grade level comparisons. HLM allows variance in outcome variables to be analyzed at multiple hierarchical levels, whereas with linear regressions, all effects are modeled to occur at a single level.

This study follows the sample from kindergarten to grade six. As with most longitudinal studies, there is evidence of attrition over time. The intervention cohort groups were comprised of a larger sample size than the comparison groups. Thus the reduction of the comparison groups, due in large part to student mobility, is more apparent than that of the intervention groups.

This study focuses on the implementation of a district's policy. Detailed and specific information on the policy's implementation is necessary to fully determine the impact of the policy on the findings of the study. Through the information gathered, an analysis of the findings was possible for some of the components and features of the policy package. A more in-depth qualitative analysis to complement this quantitative study would provide an enhanced understanding of the findings for this study.

Chapter 4: Results

This study focuses on the academic achievement and placement of the kindergarten students who participated in a full continuum of services for the *Early Childhood Intervention Program* (ECIP). The *ECIP* is designed to address the inequity of opportunities for the District's low-performing students. This longitudinal study examines the reading and mathematics performance of the kindergarteners as they progress through elementary school to grade six. Data were collected at grades 2 and 5 from CTBS and District Assessments for reading and mathematics. Grade 2 CTBS data are reported in scale scores. Grade 5 District Assessment data are reported in criterion and normed referenced formats. The *Early Childhood Intervention Program* reform was initiated in the 2000-2001 school year. This study examines the assessment data for a cohort in the year prior to the reform implementation and a cohort in each of the first two years of the reform implementation. It also investigates the special education placement at Grades 2, 5, and 6; as well as advanced mathematics placement at Grade six. The research questions for this study are:

1. How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of second grade students?
2. How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of fifth grade students?

3. How has the achievement gap narrowed between students in Title I schools who participated in the Early Childhood Intervention Program (ECIP) and non-Title I students who did not participate in the program?
4. How does participation in the Early Childhood Intervention Program (ECIP) influence whether sixth grade students receive advanced mathematics placement and experience special education placement?

Demographic Descriptives

For this study, a sample of 9858 student cases was examined. This total sample includes the year before the intervention along with the two intervention years. The ethnic and racial distribution of the sample indicates a representation of 32.6% Whites, 31% Hispanics, 23.5% African Americans, 12.6% Asian Americans, and .3% American Indians. There is little difference in the male/female representation with 48.4% of the population as female and 51.6% male. Of the total sample, 39.5% received Free and Reduced-Priced Meals (FARMS) and 25.8% is identified as English Language Learners. For students identified as receiving special education services, 11.5% of the sample was identified at grade 2, 16.1% at grade 5, and 10.2% at grade 6. The distribution of students included in the sample by the kindergarten year is relatively evenly distributed with 34.5% (3399) in the 1999-2000 school year, 33.1% (3261) in 2000-2001, and 32.4% (3198) in 2001-2002. When looking at the sample by three major cohorts, 54.4% (5353) of the sample is in the *Highest Need Title I* cohort (HNTI; 42-87% FARMS), 26.6% (2625) is in the *Moderate Need Title I* cohort (MNTI; 20-40% FARMS), and 18.5% (1880) is in the *Low Need Non-Title I* cohort (LNNTI; 5-20% FARMS).

Assessment Descriptives

Assessment data for the total sample were collected at Grades 2 and 5. Assessments in the District are administered in the spring of the year. The CTBS is administered at Grade 2 and the District State Assessment is administered at Grade 5. The CTBS scores are reported as scale scores. During the years of this study, a scale score of 609, a national percentile rank at the 55th NP, is the District's proficiency standard for Grade 2 reading; and a scale score of 567, 52nd NP, for Grade 2 mathematics. The District State Assessment is reported in both normed-referenced and criterion-referenced scores (performance level of basic, proficient, and advanced). For Grade 5 reading, the basic level of performance is a scale score below 405, the standard for proficient is a scale score of 405, and the standard for advanced is a scale score of 455. For Grade 5 mathematics, the basic level of performance is a scale score below 392, the standard for proficient is a scale score of 392, and the standard for advanced is a score of 453.

Table 4.1 *Total Sample Assessment Summary*

Assessment	N	Mean	SD
CTBS Grade 2 Mathematics	7996	580.73	48.289
CTBS Grade 2 Reading	8009	613.73	42.900
DSA Grade 5 Mathematics	6799	422.81	42.393
DSA Grade 5 Reading	6795	411.63	35.862

District Proficiency Standard Scale Scores: Grade 2 - Mathematics 567, Reading 609; Grade 5 - Mathematics 392, Reading 405

As indicated in Table 4.1, students in Grade 2 showed a higher mean score in reading (613.7) on the CTBS than mathematics (580.73) across the total sample. The sample mean scores as a whole met the District's Grade 2 proficiency standard for

reading and mathematics. In Grade 5, the District State Assessment for mathematics resulted in a higher mean score of 422.8 than the reading mean score of 411.6. The sample mean score as a whole met the District's Grade 5 proficiency standard for reading and mathematics. The Grade 5 mathematics performance placement levels were 20.9% basic, 51.5% proficient, and 22.5% advanced. The Grade 5 reading performance placement levels were 20.6% basic, 41.1% proficient, and 33.1% advanced.

Table 4.2 *Total Sample Assessment by Cohort*

Assessment	Cohort	N	Mean	SD
CTBS Grade 2 Mathematics	HNTI (42-87% FARMS)	4306	572.54	45.711
	MNTI (20-40% FARMS)	2132	584.91	49.092
	LNNTI (5-20% FARMS)	1558	597.63	49.017
CTBS Grade 2 Reading	HNTI (42-87% FARMS)	4311	604.12	40.539
	MNTI (20-40% FARMS)	2138	619.04	43.272
	LNNTI (5-20% FARMS)	1560	632.98	40.974
DSA Grade 5 Mathematics	HNTI (42-87% FARMS)	3642	414.51	40.671
	MNTI (20-40% FARMS)	1838	425.72	42.732
	LNNTI (5-20% FARMS)	1319	441.67	39.959
DSA Grade 5 Reading	HNTI (42-87% FARMS)	3642	403.09	33.293
	MNTI (20-40% FARMS)	1835	416.99	36.449
	LNNTI (5-20% FARMS)	1318	427.75	34.906

District Proficiency Standard Scale Scores: Grade 2 - Mathematics 567, Reading 609; Grade 5 - Mathematics 392, Reading 405

The assessment mean scores of the total sample (Table 4.2) were examined by cohort groups including the pre-intervention and the two intervention years. The total sample disaggregated by the three SES groups shows the LNNTI group outperforming

the HNTI and MNTI groups at both Grades 2 and 5 for mathematics and reading. The group means differences between the HNTI cohort and the LNNTI cohort ranged between twenty-five and twenty-nine points across the grade levels and content areas. The Grade 2 mathematics group means score differences were approximately the same between the HNTI and the MNTI and the MNTI and the LNNTI with roughly a twelve-point difference each. There was a slight increase in the group means score differences for Grade 2 reading (approximately 14 points). An even greater point spread was seen between Grade 5 mathematics (approximately 11 points between HNTI and MNTI; and 16 points between MNTI and LNNTI) and Grade 5 reading (approximately 14 points between HNTI and MNTI; and 11 points between MNTI and LNNTI).

Table 4.3 *Highest Need Title I Cohort and Moderate Need Title I Cohort*

Variable	HNTI and MNTI Group Mean Difference	t	95% Confidence Interval	
			Lower	Upper
Grade 2 CTBS Math SS	-12.364	-9.727	-14.856	-9.872
Grade 2 CTBS Read SS	-14.916	-13.304	-17.114	-12.718
Grade 5 DSA Math SS	-11.204	-9.312	-13.563	-8.845
Grade 5 DSA Read SS	-13.895	-13.702	-15.883	-11.906

A *t*-test of statistical significance was conducted to test for the significance of the group means score differences discussed between the cohort groups in Table 4.2. According to Levene's Test for Equality of Means, there were statically significant ($p<0.05$) differences for the Grade 2 reading and Grade 5 mathematics and reading comparisons of the *HNTI* and *MNTI* cohorts, but not for Grade 2 mathematics as indicated in Table 4.3.

Table 4.4 *Highest Need Title I Cohort and Low Need Non-Title I Cohort*

Variable	HNTI and LNNTI Group Mean Difference	t	95% Confidence Interval	
			Lower	Upper
Grade 2 CTBS Math SS	-25.089	-17.620	-27.881	-22.297
Grade 2 CTBS Read SS	-28.853	-23.900	-31.220	-26.486
Grade 5 DSA Math SS	-27.160	-21.050	-29.690	-24.630
Grade 5 DSA Read SS	-24.664	-22.249	-26.837	-22.490

The group means score differences for the *HNTI* and the *LNNTI* cohort groups were shown in Table 4.2 and discussed. A *t*-test of statistical significance was conducted to test for the significance of these differences. As indicated in Table 4.4, Levene's Test for Equality of Means does not show statically significant ($p<0.05$) differences for the reading and mathematics comparisons of the *HNTI* and *LNNTI* cohorts at Grade 2 and Grade 5.

Table 4.5 *First Two Intervention Years Demographics*

Ethnicity	HNTI (42-87% FARMS)	MNTI (20-40% FARMS)	LNNTI (5-20% FARMS)
American Indian	14 (.4%)	1 (.1%)	1 (.1%)
Asian American	359 (10.1%)	239 (14.3%)	232 (18.8%)
African American	910 (25.6%)	443 (26.5%)	162 (13.1%)
White	635 (17.9%)	661 (39.6%)	734 (59.6%)
Hispanic	1638 (46.1%)	327 (19.6%)	103 (8.4%)

Demographic information for the first two years of the intervention by cohort is presented in Table 4.5. Though the percentages for the total sample are almost identical for Whites (32.6%) and Hispanics (31%), this table shows an indication of a high representation of Hispanic students (46.1%) in the *Highest Need Title I* cohort and a low representation of 8.4% for Hispanics in the *Low Need Non-Title I* cohort, which is heavily populated with White students (59.6%). There is also a relatively low representation of African Americans (13.1%) in *LNNTI* cohort, though they represent approximately one quarter of the two Title I cohorts. The representation of American Indians (.3%) is the smallest in the total sample and only .2% for the first two intervention years included in this study.

An examination of the first two years of the intervention mean scores by cohort reveals slightly higher total group mean scores compared to *the total sample which includes the pre-intervention year.* As indicated in Table 4.6, Grade 2 reading scores report a total mean score of 615.7 compared to (Table 4.1) the total sample mean score of 613.7 and a mathematics total mean score of 584.3 compared to a 580.7 total sample mean score. These increases in mean scores for the two years of the intervention in both content areas demonstrate the potential influence of the reform initiative on the sample as a whole. Likewise, Grade 5 reading and mathematics scores show an approximate two-point gain compared to the total sample (mathematics 413.4, 411.6 and reading 424.7, 422.8). The total mean scores for each grade level assessment meets the District's proficiency standard as indicated in Table 4.6 For each assessment, the *Highest Need Title I* cohort has the lowest mean score and the *Low Need Non-Title I* cohort has the

highest mean score. An analysis of the cohort group mean scores by year and grade level is provided to answer the research questions for this study.

Table 4.6 *First Two Intervention Years Assessment Descriptives*

Assessment	Cohort	N	Mean	SD
Grade 2 CTBS Math SS	42-87% FARMS (Intervention)	2889	577.25	46.185
	20-40% FARMS (Comparison)	1372	587.82	46.955
	3-5% FARMS (Comparison)	1016	599.38	49.690
	Total	5277	584.26	47.852
Grade 2 CTBS Read SS	42-87% FARMS (Intervention)	2891	607.03	39.939
	20-40% FARMS (Comparison)	1377	620.51	42.152
	3-5% FARMS (Comparison)	1017	633.84	41.228
	Total	5285	615.70	42.101
Grade 5 DSA Math SS	42-87% FARMS (Intervention)	2389	417.30	38.803
	20-40% FARMS (Comparison)	1166	427.49	39.747
	3-5% FARMS (Comparison)	851	441.40	39.689
	Total	4406	424.65	40.295
Grade 5 DSA Read SS	42-87% FARMS (Intervention)	2389	405.29	32.727
	20-40% FARMS (Comparison)	1163	419.13	34.621
	3-5% FARMS (Comparison)	850	428.51	34.341
	Total	4402	413.43	34.836

District Proficiency Standard Scale Scores: Grade 2 - Mathematics 567, Reading 609; Grade 5 - Mathematics 392, Reading 405

Research Questions

*Question One***:**

How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of second grade students?

Table 4.7 *Grade 2 CTBS Reading Assessment Mean Scores*

School Year	Cohort	N	Mean	S.D.
G2: 2001-2002 (K: 1999-2000) Pre-Intervention Year	Highest Need Title I	1420	598.22	41.120
	Moderate Need Title I	761	616.38	45.136
	Low Need Non-Title I	543	631.36	40.484
	Total	2724	609.90	44.167
G2: 2002-2003 (K: 2000-2001) Intervention Year 1	Highest Need Title I	1443	606.35	40.392
	Moderate Need Title I	710	617.93	42.989
	Low Need Non-Title I	525	630.81	41.791
	Total	2678	614.22	42.439
G2: 2003-2004 (K: 2001-2002) Intervention Year 2	Highest Need Title I	1448	607.69	39.486
	Moderate Need Title I	667	623.26	41.095
	Low Need Non-Title I	492	637.08	40.410
	Total	2607	617.22	41.704

* District Proficiency Standard Scale Score: Grade 2 Reading 609
** Only the HNTI Cohort received the intervention for Year 1 and Year 2

A One-way ANOVA was conducted using Grade 2 CTBS reading scale scores as the dependent variable and cohort groups as the independent variables. Cohort mean

scores are given in Table 4.7. For the Grade 2 school year (2001-2002), of the pre-intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2721) = 133.881$, $p<0.05$. According to the multiple comparisons post hoc report, the Tukey HSD test indicates the mean score of the *Highest Need Title I* intervention cohort is less than the *Moderate Need Title I* cohort by -18.162; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -33.145 (Appendix D).

For the Grade 2 school year (2002-2003), of the first intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2675) = 71.120$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the mean score of the *MNTI* cohort by – 11.571; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -24.451 (Appendix E). For the Grade 2 school year (2003-2004), of the second intervention year, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2604) = 108.874$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the mean score of the *MNTI* cohort by -15.568; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -29.383 (Appendix F).

When comparing the pre-intervention year group mean scores to the initial intervention year to determine mean score gains for Grade 2 reading assessments, the *HNTI* cohort shows greater gain (8.13 points) than both of the comparison cohorts *MNTI* (1.5 points) and *LNNTI* (-0.55). The *HNTI* cohort also surpassed the comparison cohorts

with 9.47 points compared to the *MNTI's* 6.88-point and *LNNT's* 5.72-point gains when comparing the second year of the intervention to the pre-intervention year.

A hierarchical regression was conducted with Grade 2 CTBS reading mean scores as the dependent variable. Independent variables were entered stepwise. In the first step, the cohorts were entered as predictors, days present in school in the second step, and demographic variables in the third step. Each model was statistically significant in terms of contributing to the explanation of the dependent variable, second grade reading scores. The results of each model are combined in Table 4.8.

Table 4.8 *Grade 2 CTBS Reading Scores Hierarchical Regression*

Variable	*B*	*SE B*	β
Step 1			
MNTI/HNTI	13.485	1.335	.141
LNTI/HNTI	26.814	1.487	.251
Step 2			
MNTI/HNTI	13.138	1.334	.137
LNTI/HNTI	26.501	1.485	.248
Days in School– K	.120	.024	.066
Step 3			
MNTI/HNTI	4.815	1.323	.050
LNTI/HNTI	11.273	1.558	.106
Days in School – K	.068	.023	.038
Female/Male	9.069	1.062	.108
African American/White	-24.682	1.527	-.246
Hispanic/White	-22.943	1.671	-.257
Asian/White	-3.703	1.849	-.029
American Indian/White	-31.166	10.755	-.037
ELL/Non-ELL	-11.623	1.429	-.126

Note. R^2 = .062 for Step 1 ($p < .05$); ΔR^2 = .004 for Step 2 ($p < .05$); R^2 = .067 for Step 2; ΔR^2 = .097 for Step 3($p < .05$); R^2 =.163 for Step 3.

When the variable days present in kindergarten was added to the model, the difference between the *HNTI* cohort and the *MNTI* cohort was reduced to .137 and the difference between the *HNTI* cohort and the *LNNTI* cohort was reduced to .248. One unit increase in the days present in kindergarten was associated with a .066 unit of increase in second grade reading scores controlling for other variables. When gender, ethnicity, English Language Learner (ELL) were added to the model , the difference between the *HNTI* cohort and the *MNTI* cohort was reduced to .050 and the difference between the *HNTI* cohort and the *LNNTI* cohort reduced to .106. The second grade reading score of female students is .108 unit higher than that of male students. The second grade reading score of ELL students was .126 unit lower than that of non-ELL students. The Asian students' reading score was .029 unit lower that that of White students. The African American students' reading score was .246 unit lower than that of White students. The Hispanic students' reading score is .257 unit lower than that of White students and American Indian students' reading score was .037 unit lower than White students (Appendix G).

The data in Table 4.8 indicate that the selected independent variables accounted for a small, but significant, portion of the variance in second grade reading scores. The greatest relations were found between ethnicity and second grade reading scores. Specifically, children of African American and Hispanic backgrounds had lower reading scores. Although the relation was smaller, there was also lower reading performance for the Title I group of students than the Non-Title I group. A similarly small relation was found between gender and second grade reading scores, with girls having higher performance.

Table 4.9 *Grade 2 CTBS Mathematics Assessment Mean Scores*

School Year	Cohort	N	Mean	SD
G2: 2001-2002 (K: 1999-2000) Pre-Intervention Year	Highest Need Title I	1417	562.95	43.181
	Moderate Need Title I	760	579.65	52.352
	Low Need Non-Title I	542	594.35	47.601
	Total	2719	573.87	48.404
G2: 2002-2003 (K: 2000-2001) Intervention Year 1	Highest Need Title I	1439	574.28	47.337
	Moderate Need Title I	705	584.21	48.796
	Low Need Non-Title I	523	593.17	47.979
	Total	2667	580.61	48.416
G2: 2003-2004 (K: 2001-2002) Intervention Year 2	Highest Need Title I	1450	580.20	44.835
	Moderate Need Title I	667	591.64	44.647
	Low Need Non-Title I	493	605.98	50.663
	Total	2610	588.00	46.984

* District Proficiency Standard Scale Score: Grade 2 Mathematics 567
** Only the HNTI Cohort received the intervention for Year 1 and Year 2

A One-way ANOVA was conducted using Grade 2 CTBS mathematics scale scores as the dependent variable and cohort groups as the independent variable. Cohort mean scores are given in Table 4.9. For the Grade 2 school year (2001-2002), of the pre-intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2716) = 96.343$, $p<0.05$. According the multiple comparisons post hoc report, the Tukey HSD test indicates the mean score of the *Highest Need Title I* intervention cohort is less than the mean score of the *Moderate Need*

Title I cohort by -16. 702; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -31.407 (Appendix H).

For the Grade 2 school year (2002-2003), of the first intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2664) = 32.593$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the mean score of the *MNTI* cohort by -9928; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -18.888 (Appendix E).

For the Grade 2 school year (2003-2004), of the second intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2607) = 60.719$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the mean score of the *MNTI* cohort by -11.440; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -25.775 (Appendix F).

As shown in Table 4.9, Grade 2 mathematics assessments for the initial intervention year compared to the pre-intervention year indicate greater mean score gains for the *HNTI* cohort (11.33) than those for the comparison cohorts *MNTI* (4.56) and *LNNTI* (-1.18). The *HNTI* cohort (17.25) also surpassed the comparison cohorts *MNTI* (11.99) and *LNNTI* (11.63) in gains when comparing the second year of the intervention to the pre-intervention year.

Table 4.10 *Grade 2 CTBS Mathematics Scores Hierarchical Regression*

Variable	*B*	*SE B*	β
Step 1			
MNTI/HNTI	10.570	1.544	.097
LNTI/HNTI	22.131	1.717	.182
Step 2			
MNTI/HNTI	10.146	1.542	.093
LNTI/HNTI	21.749	1.715	.179
Days in School– K	.142	.028	.069
Step 3			
MNTI/HNTI	1.513	1.530	.014
LNTI/HNTI	4.335	1.799	.036
Days in School – K	.099	.026	.048
Female/Male	-2.464	1.227	-.026
African American/White	-32.135	1.764	-.282
Hispanic/White	-21.987	1.929	-.216
Asian/White	6.166	2.138	.043
American Indian/White	-31.617	12.415	-.033
ELL/Non-ELL	-14.267	1.650	-.136

Note. R^2 = .032 for Step 1 ($p < .05$); ΔR^2 = .005 for Step 2 ($p < .05$); R^2 = .037 for Step 2; ΔR^2 = .100 for Step 3 ($p < .05$); R^2 =.137 for Step 3.

A hierarchical regression was conducted with Grade 2 CTBS mathematics scale scores as the dependent variable. Independent variables were entered stepwise. In the first step, the cohorts were entered as predictors, days present in school in the second step, and demographic variables in the third step. Each model was statistically significant in terms of contributing to the explanation of the dependent variable, second grade mathematics scores. The results of each model are combined in Table 4.10.

When the variable days present in kindergarten was added to the model, the difference between the *HNTI* cohort and the *MNTI* cohort was reduced to .093 and the difference between the *HNTI* cohort and the *LNNTI* cohort was reduced to .179. One unit increase in the days present in kindergarten was associated with a .069 unit of increase in second grade mathematics scores controlling for other variables. When gender, ethnicity, English Language Learner (ELL) were added to the model, the difference between the *HNTI* cohort and *MNTI* cohort was reduced to .014 and the difference between the *HNTI* cohort and the *LNNTI* cohort was reduced to .036. The second grade mathematics score of female students was .026 unit lower than that of male students. The second grade mathematics score of ELL students was .136 unit lower than that of non-ELL students. The Asian students' mathematics score was .043unit higher than that of White students. The African American students' mathematics score was .282 unit lower than that of White students. The Hispanic students' mathematics score was .216 unit lower than that of White students and American Indian students' mathematics score was .033 unit lower than White students (Appendix I).

Similar to the Grade 2 reading hierarchical regression, mathematics regression data in Table 4.10 indicate that the selected independent variables accounted for a small,

but significant portion of the variance in second grade mathematics scores. Like second grade reading scores, the greatest relations were found between ethnicity and second grade mathematics. Children of African American and Hispanic backgrounds again had lower mathematics reading scores. There was also a lower performance of ELL students compared to Non-ELL students

Table 4.11 *Grade 2 Special Education*

Grade 2	HNTI (42-87% FARMS)	MNTI (20-40% FARMS)	LNNTI (5-20% FARMS)
2001-2002 (K:99-00)	N=141/1512 (9.3%)	N=124/798 (15.5%)	N=53/566 (9.4%)
2002-2003 (K:00-01)	N=160/1500 (10.7%)	N=111/749 (14.8%)	N=49/539 (9.1%)
2003-2004 (K:01-02)	N=183/1534 (11.9%)	N=87/698 (12.5%)	N=59/513 (11.5%)

As indicated in Table 4.11, Grade 2 students receiving special education in the *Highest Need Title I* cohort continuously increased from the pre-intervention year in 2002- 2002 to the second year of the intervention in 2003-2004. Fewer students in the pre-intervention group (9.3%) received special education than did those in the initial year of the intervention (10.7%) and those the second year of the intervention (11.9%). However, students in the *Moderate Need Title I* cohort who required special education decreased across the three-year span. Students in the *Low Need Non-Title I* cohort showed a decrease from the pre-intervention year to the first year of the intervention, then an increase for the second intervention year.

Question Two:

How does participation in the Early Childhood Intervention Program (ECIP) influence the reading scores, mathematics scores, and special education placement of fifth grade students?

Table 4.12 *Grade 5 DSA Reading Assessment Mean Scores*

School Year	Cohort	N	Mean	SD
G5: 2004-2005 (K: 1999-2000) Pre-Intervention Year	Highest Need Title I	1253	398.89	33.965
	Moderate Need Title I	672	413.27	39.163
	Low Need Non-Title I	468	426.38	35.908
	Total	2393	408.30	37.458
G5: 2005-2006 (K: 2000-2001) Intervention Year 1	Highest Need Title I	1226	403.81	32.581
	Moderate Need Title I	607	415.59	33.458
	Low Need Non-Title I	454	424.58	34.350
	Total	2287	411.06	34.196
G5: 2006-2007 (K: 2001-2002) Intervention Year 2	Highest Need Title I	1163	406.86	32.820
	Moderate Need Title I	556	422.99	35.477
	Low Need Non-Title I	396	433.02	33.815
	Total	2115	416.00	35.344

* District Proficiency Standard Scale Score: Grade 5 Reading 405
** Only the HNTI Cohort received the intervention for Year 1 and Year 2

A One-way ANOVA was conducted using Grade 5 DSA reading scale scores as the dependent variable and cohort groups as the independent variable. Cohort mean

scores are given in Table 4.12 For the Grade 5 school year (2004-2005), of the pre-intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2390) = 109{,}004$ $p<0.05$.

According to the multiple comparisons post hoc report, the Tukey HSD test indicates the mean score of the *Highest Need Title I* intervention cohort is less than the mean score of the *Moderate Need Title I* cohort by -14.385; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -27.489 (Appendix J). For the Grade 5 school year of (2005-2006), of the first intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2284) = 72.688$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the *MNTI* cohort by -11.783; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -20.775 (Appendix E). For the Grade 5 school year (2006-2007), of the second intervention year, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2112) = 105.068$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the mean score of the *MNTI* cohort by -16.132; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -26.154 (Appendix F).

Grade 5 reading assessments for the initial intervention year continue to show the *HNTI* cohort with greater gains, as seen in Table 4.12. When comparing mean score gains for the initial intervention year to the pre-intervention year, the *HNTI* cohort's gain of 4.92 is greater than the *MNTI* cohort's gain of 2.32 and the *LNNTI* cohort's decreased

group mean score of -1.8. For the second year of the intervention compared to the pre-intervention year, the *HNTI* cohort did not lead the gains with 7.97 but was second to the *MNTI* cohort's 9.72 group mean gain. The *LNNTI* cohort showed a gain in the second year of the intervention of 6.64 when comparing the second year of the intervention to the pre-intervention year.

When looking at these data based on the District's benchmark criterion-referenced scale for proficiency (Table 4.13), the students in the *HNTI* cohort show an increase in the number of students performing at proficient and advanced when comparing the students in initial intervention year and those who received the intervention the second year to the students in the pre-intervention year. Likewise, Table 4.13 shows increases at the proficient and advanced levels across the years for the *MNTI* cohort. On the contrary, the students in the *LNNTI* cohort show fluctuation cross the years. The number of students performing at a basic level increases while those performing at a proficient level decreases when comparing the pre-intervention year to the initial intervention year. However, there is an increase in the students who performed at the advanced level for the two intervention years and a continued decrease is seen in performance at the proficient level for those years. A decrease is also noted in the students who performed basic for the second year of the intervention, which appears to be a recovery from the initial year with more students performing higher.

Table 4.13 *Grade 5 Reading Proficiency Benchmarks*

	HNTI (42-87% FARMS)	MNTI (42-87% FARMS)	LNNTI (5-20% FARMS)
2004-2005 (K:1999-2000)			
Basic	399 (31.8%)	147 (21.9%)	48 (10.3%)
Proficient	591 (47.2%)	265 (39.4%)	195 (41.7%)
Advanced	263 (21.0%)	260 (38.7%)	225 (48.1%)
	N=1253	N=672	N=468
2005-2006 (K:2000-2001)			
Basic	323 (27.1%)	104 (17.1%)	49 (10.8%)
Proficient	567 (46.2%)	255 (42.0%)	159 (35.0%)
Advanced	327 (26.7%)	248 (40.9%)	246 (54.2%)
	N = 1226	N = 607	N = 454
2006-2007 (K:2001-2002)			
Basic	294 (25.3%)	75 (13.5%)	31 (7.8%)
Proficient	557 (47.9%)	224 (40.3%)	129 (32.6%)
Advanced	312 (26.8%)	257 (46.2%)	236 (59.6%)
	N = 1163	N = 556	N = 396

District Reading Benchmark (criterion-referenced scale) - DSA scale scores = Basic >405, Proficient 405, Advanced 455

When comparing the combined proficient and advanced performance levels of the *HNTI* cohort to the *LNNTI* cohort for the pre-intervention year, there is a 21.6% difference between the cohorts' performances. For the initial intervention year the difference is 16.3%; and for the second year the difference is 17.5%. Hence, the

differences are reduced when comparing the intervention years to the pre-intervention year for the *HNTI* and the *LNNTI* cohorts. However, the *HNTI* and the *MNTI* cohorts show increases in the differences of combined proficient and advanced levels when comparing the pre-intervention year (9.9%) to the initial intervention year (10.0%), and second year intervention (11.8%). Thus, the differences are greater when comparing the intervention years to the pre-intervention years for the *HNTI* and the *MNTI* cohorts.

At the advanced level, for the initial intervention year compared to the pre-intervention, the *HNTI* cohort showed a 5.7%, the *MNTI* cohort showed 2.2 % gain and the *LNNTI* cohort showed a 6.1 gain. All of the cohorts experienced gains the second intervention year as well; the *HNTI* cohort showed a 5.8% gain and *MNTI* cohort showed a 5.3 gain. The *LNNTI* cohort show a disproportionate 11.5% gain comparing the second year to the pre-intervention year.

A hierarchical regression was conducted with DSA Grade 5 reading scale scores as the dependent variable. Independent variables were entered stepwise. In the first step, the cohorts were entered as predictors, CTBS Grade 2 reading scale scores in the second step, days in school and special education in the third step, and demographic variables in the fourth step. Models 1, 2, and 3 were statistically significant in terms of contributing to the explanation of the dependent variable, fifth grade reading scores. In Model 4, Asians and American Indians are not statistically significant. The results of each model are combined in Table 4.14.

Table 4.14 *Grade 5 DSA Reading Hierarchical Regression*

Variable	*B*	*SE B*	β
Step 1			
MNTI/HNTI	13.917	1.211	.177
LNTI/HNTI	23.141	1.353	.264
Step 2			
MNTI/HNTI	6.566	.962	.084
LNTI/HNTI	8.200	1.101	.093
Grade 2 Read SS	.507	.010	.620
Step 3			
MNTI/HNTI	6.684	.954	.085
LNTI/HNTI	8.210	1.093	.094
Grade 2 Read SS	.478	.010	.584
Days in School – Gr. 5	.221	.048	.053
Special Education – Gr. 5	-8.731	1.177	-.091
Step 4			
MNTI/HNTI	3.798	.974	.048
LNTI/HNTI	2.493	1.164	.028
Grade 2 Read SS	.434	.011	.530
Days in School – Gr. 5	.221	.047	.053
Special Education – Gr. 5	-8.751	1.160	-.091
Female/Male	2.585	.789	.037
African American/White	-12.610	1.168	-.151
Hispanic/White	-10.316	1.252	-.140
Asian/White	.799	1.331	.008
American Indian/White	.992	8.098	.001
ELL/Non-ELL	-3.115	1.056	-.041

Note. R^2 = .073 for Step 1 ($p < .05$); ΔR^2 = .355 for Step 2 ($p < .05$); R^2 = .429 for Step 2; ΔR^2 = .010 for Step 3 ($p < .05$); R^2 =.439 for Step 3; ΔR^2 = .025 for Step 4 ($p <. 05$); R^2 = .464 for Step 4.

When the variable CTBS Grade 2 reading scale scores was added to the model, the difference between the *HNTI* cohort and the *MNTI* cohort was reduced to .084 and the difference between the *HNTI* cohort and the *LNNTI* cohort was reduced to .093. One unit increase in the CTBS Grade 2 reading scale scores was associated with a .620 unit of increase in fifth grade reading scores controlling for other variables. When days present in Grade 5 and special education placement in Grade 5 were added to the model, the difference between the *HNTI* cohort and *MNTI* cohort was increased to .085; the difference between the *HNTI* cohort and the *LNNTI* cohort increased to .094; and Grade 2 reading scales score decreased to .584. One unit increase in days present in fifth grade was associated with a .053 unit of increase; and one unit of increase in special education was associated with a .091 unit of decrease in fifth grade reading scores controlling for other variables. When gender, ethnicity, and English Language Learner (ELL) were added to the model, the difference between the *HNTI* cohort and the *MNTI* was decreased to .048 and the difference between the *HNTI* and the *LNNTI* cohort was decreased to .028. Grade 2 reading scale scores were decreased to .530. Days in school in fifth grade and special education remained the same. The fifth grade reading score of female students was .037 unit higher then that of male students. The African American students' reading score was .151 unit lower than that of White students. The Hispanic students' reading score was .140 unit lower than that of White students. The Asian students' reading score was .008 unit higher than that of White students and American Indian students' reading score was .001 unit higher than White students. The fifth grade reading score of ELL students was .041 unit lower than that of non-ELL students. (Appendix K)

The data in Table 4.14 indicate that the selected independent variables accounted for a small, but significant, portion of the variance in fifth grade reading scores. Like the data for second grade reading, the greatest relations were found between ethnicity and fifth reading scores. Again, like second grade reading, children of African American and Hispanic backgrounds had lower reading scores. Also, there was as a lower performance for students receiving special education services and English Language Learners, though the relation was smaller.

A One-way ANOVA was conducted using Grade 5 DSA mathematics scale scores as the dependent variable and cohort groups as the independent variable. Cohort mean scores are given in Table 4.15. For the Grade 5 school year (2004-2005), of the pre-intervention year group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2390) = 97.848$ $p<0.05$. According the multiple comparisons post hoc report, the Tukey HSD test indicates the mean score of the *Highest Need Title I* intervention cohort is less than the mean score of the *Moderate Need Title I* cohort by -13.446; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -32.972 (Appendix J)

Table 4.15 *Grade 5 DSA Mathematics Assessment Mean Scores*

School Year	Cohort	N	Mean	SD
G5: 2004-2005 (K: 1999-2000) Pre-Intervention Year	Highest Need Title I	1253	409.20	43.536
	Moderate Need Title I	672	422.64	47.342
	Low Need Non-Title I	468	442.17	40.485
	Total	2393	419.42	45.822
G5: 2005-2006 (K: 2000-2001) Intervention Year 1	Highest Need Title I	1227	414.64	41.445
	Moderate Need Title I	609	424.04	41.202
	Low Need Non-Title I	454	436.32	41.768
	Total	2290	421.44	42.269
G5: 2006-2007 (K: 2001-2002) Intervention Year 2	Highest Need Title I	1162	420.11	35.606
	Moderate Need Title I	557	431.26	37.770
	Low Need Non-Title I	397	447.22	36.358
	Total	2116	428.13	37.745

* District Proficiency Standard Scale Score: Grade 5 Mathematics 392
** Only the HNTI Cohort received the intervention for Year 1 and Year 2

For the Grade 5 school year (2005-2006), of the first year intervention group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2287) = 46.973$, $p<0.05$. The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the *MNTI* cohort by -9.405; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -21.678 (Appendix E). For the Grade 5 school year (2006-2007), of the second year intervention group, significant differences were found between the intervention cohort and the non-intervention cohorts, $F(2, 2113) = 85.147$, $p<0.05$.

The Tukey HSD test indicates the mean score of the *HNTI* intervention cohort is less than the mean score of the *MNTI* cohort by -11.144; and the mean score of the *HNTI* intervention cohort is less than the mean score of the *Low Need Non-Title I* cohort by -27.102 (Appendix F).

Grade 5 mathematics assessment mean scores presented in Table 4.15 show the *HNTI* cohort continuing to surpass the comparison cohorts in gains when comparing the intervention years to the pre-intervention year. When comparing mean score gains for the initial intervention year to the pre-intervention year, the *HNTI* cohort's gain of 5.44 is greater than the *MNTI* cohort's gain of 1.4 and the *LNNTI* cohort's decreased group mean score of -5.85. For the second year of the intervention compared to the pre-intervention year, the *HNTI* cohort show a gain of 10.91, the *MNTI* cohort a gain of 8.62 and the *LNNTI* cohort showed a gain of 5.05

Table 4.16 shows student performance for the District's criterion-referenced proficiency benchmark scale. The *HNTI* cohort demonstrates a continuous increase in those who performed proficient and advanced across the three years. Students in the *MNTI* cohort show continued increase in the percentage that performed at a proficient level. However, those performing at the advanced level staggered around 27% for the three years. Scores for the students in the *LNNTI* cohort fluctuated up and down across the three years for the levels of performance (basic, proficient, and advanced).

Table 4.16 *Grade 5 Mathematics Proficiency Benchmarks*

	HNTI (42-87% FARMS)	MNTI (42-87% FARMS)	LNNI (5-20% FARMS)
2004-2005 (K:1999-2000)			
Basic	402 (32.1%)	167 (24.9%)	47 (10.0%)
Proficient	653 (52.1%)	324 (48.2%)	239 (51.1%)
Advanced	198 (15.8%)	181 (26.9%)	182 (38.9%)
	N = 1253	N = 672	N = 468
2005-2006 (K:2000-2001)			
Basic	342 (27.9%)	123 (20.2%)	53 (11.7%)
Proficient	679 (55.3%)	324 (53.2%)	249 (54.8%)
Advanced	206 (16.8%)	162 (26.6%)	152 (33.5%)
	N = 1227	N = 609	N = 454
2006-2007 (K:2001-2002)			
Basic	247 (21.3%)	84 (15.1%)	32 (8.1%)
Proficient	706 (60.8%)	324 (58.2%)	190 (47.9%)
Advanced	209 (18.0%)	149 (26.8%)	175 (44.1%)
	N = 1162	N = 557	N = 397

District Reading Benchmark (criterion-referenced scale) - DSA scale scores = Basic >372, Proficient 372, Advanced 453

When comparing the combined proficient and advanced performance levels of the *HNTI* cohort to the *LNNTI* cohort for the pre-intervention year, there is a 22.1% difference between the cohorts' performances. For the initial intervention year the difference is 16.2%; and for the second intervention year the difference is 13.2%. Hence,

the differences are reduced when comparing the intervention years to the pre-intervention year for the *HNTI* and the *LNNTI* cohorts. The combined proficient and advanced levels fluctuate for the *HNTI* cohort and the *MNTI* cohort with a slight increase when comparing the pre-intervention year (7.2%) to the initial intervention year (7.7%). However, for the second year of intervention the difference decreased to 6.2% for the *HNTI* and the *MNTI* cohorts. While the *HNTI* cohort showed gain (1.0%) at the advanced level for initial intervention year compared to the pre-intervention year, the *MNTI* cohort (-0.3%) and the *LNNTI* cohort (-5.4) regressed from the pre-intervention year. However, this is not true for the second intervention year where the *LNNTI* cohort show a 5.2% increase compared to the pre-intervention year. The *MNTI* cohort shows a slight (-0.2%) difference.

A hierarchical regression was conducted with DSA Grade 5 mathematics scale scores as the dependent variable. Independent variables were entered stepwise. In the first step, the cohorts were entered as predictors, CTBS Grade 2 mathematics scale scores in the second step, days in school and special education in the third step, and demographic variables in the fourth step. Models 1, 2, and 3 were statistically significant in terms of contributing to the explanation of the dependent variable, fifth grade reading scores. In Model 4, the Moderate Need Title I cohort, Asians, American Indians, and English Language Learners are not statistically significant. The results of each model are combined in Table 4.17.

Table 4.17 *Grade 5 DSA Mathematics Hierarchical Regression*

Variable	*B*	*SE B*	β
Step 1			
MNTI/HNTI	10.077	1.418	.111
LNTI/HNTI	23.960	1.582	.236
Step 2			
MNTI/HNTI	3.600	1.035	.040
LNTI/HNTI	9.798	1.171	.097
Grade 2 Math SS	.569	.009	.684
Step 3			
MNTI/HNTI	3.514	1.013	.039
LNTI/HNTI	9.334	1.147	.092
Grade 2 Math SS	.530	.010	.637
Days in School – Gr. 5	.419	.051	.087
Special Education – Gr. 5	-13.529	1.247	-.122
Step 4			
MNTI/HNTI	.976	1.033	.011
LNTI/HNTI	3.563	1.229	.035
Grade 2 Math SS	.488	.010	.587
Days in School – Gr. 5	.416	.050	.087
Special Education – Gr. 5	-13.467	1.228	-.121
Female/Male	2.852	.837	.036
African American/White	-16.125	1.251	-.167
Hispanic/White	-11.502	1.322	-.135
Asian/White	2.462	1.411	.021
American Indian/White	-4.687	8.588	-.006
ELL/Non-ELL	.914	1.122	.010

Note. R^2 = .053 for Step 1 ($p < .05$); ΔR^2 = .449 for Step 2 ($p < .05$); R^2 = .501 for Step 2; ΔR^2 = .022 for Step 3 ($p < .05$); R^2 =.523 for Step 3; ΔR^2 = .027 for Step 4 ($p <. 05$); R^2 = .550 for Step 4.

When the variable CTBS Grade 2 mathematics scale scores was added to the model, the difference between the *HNTI* cohort and the *MNTI* cohort was reduced to .040 and the difference between the *HNTI* cohort and the *LNNTI* cohort was reduced to .097. One unit increase in the CTBS Grade 2 mathematics scale scores was associated with a .684 unit of increase in fifth grade mathematics scores controlling for other variables. When days present in Grade 5 and special education placement in Grade 5 were added to the model, the difference between the *HNTI* cohort and *MNTI* cohort was decreased to .039; the difference between the *HNTI* cohort and the *LNNTI* cohort decreased to .092; and Grade 2 mathematics scale scores decreased to .637. One unit increase in days present in fifth grade was associated with a .087 unit of increase; and one unit of increase in special education was associated with a .122 unit of decrease in fifth grade reading scores controlling for other variables. When gender, ethnicity, and English Language Learner (ELL) were added to the model, the difference between the *HNTI* cohort and the *MNTI* was decreased to .011 and the difference between the *HNTI* and the *LNNTI* cohort was decreased to .035. Grade 2 mathematics scale scores were decreased to .587. Days in school in fifth grade remained the same and special education was decreased to -.121. The fifth grade mathematics score of female students was .036 unit higher than that of male students. The African American students' reading score was .167 unit lower than that of White students. The Hispanic students' reading score was .135 unit lower than that of White students. The Asian students' reading score was .021 unit higher than that of White students and American Indian students' reading score was .006 unit lower than White students. The fifth grade reading score of ELL students was .010 unit higher than that of non-ELL students. (Appendix K)

The data in Table 4.17 indicate that the selected independent variables accounted for a small, but significant, portion of the variance in fifth grade mathematics scores. Like the data for second grade mathematics, the greatest relations were found between ethnicity and fifth mathematics scores. Again, like second grade mathematics, children of African American and Hispanic backgrounds had lower reading scores. Also, there was a lower reading performance for American Indian students. Similar to fifth grade mathematics, there was a lower performance for students receiving special education services.

As indicated in Table 4.18, students receiving special education in grade five continued to decrease for each of the cohorts. Lower percentages of students participated in special education for the initial year of the intervention and the second year compared to the year prior to the intervention for each cohort. The *HNTI* cohort's decrease was not as great as the other two comparison cohorts that did not receive the intervention.

Table 4.18 *Grade 5 Special Education*

Grade 5	HNTI (42-87% FARMS)	MNTI (20-40% FARMS)	LNNTI (5-20% FARMS)
2004-2005 (K:99-00)	N=229/1300 (17.6%)	N=135/694 (19.5%)	N=65/483 (13.5%)
2005-2006 (K:00-01)	N=222/1265 (17.5%)	N=119/628 (18.9%)	N=59/469 (12.6%)
2006-2007 (K:01-02)	N=201/1199 (16.8%)	N=88/579 (15.2%)	N=37/407 (9.1%)

Question Three:

How has the achievement gap narrowed between students in Title I schools who participated in the Early Childhood Intervention Program (ECIP) and non-Title I students who did not participate in the program?

Using mean score data from reading and mathematics achievement assessments over three years, achievement trends across the nine cohort groups were examined. Table 4.19 shows the mean scores for the pre-intervention year (1999-2000) kindergartners at Grade 2 and Grade 5. For the first intervention year (2000-2001) kindergarten cohorts, the mean scores for Grade 2 and Grade 5 are given and a comparison to the pre-intervention (1999-2000) kindergarten cohorts at the same grade levels indicating an increase or decrease in the mean scores. For the second intervention year (2001-2002) kindergarten cohorts, mean scores for Grade 2 and Grade 5 are given, along with a comparison to the first intervention year (2000-2001) cohorts and a comparison to the pre-intervention year (1999-2000) kindergarten cohort groups.

Table 4.19 *Achievement Trends*

Pre-Intervention Year	Grade 2 Read	Grade 2 Math	Grade 5 Read	Grade 5 Math
HNTI (42-87% FARMS)	598.22	562.95	398.89	409.20
MNTI (20-40% FARMS)	616.38	579.65	413.27	422.64
LNNTI (5-20% FARMS)	631.36	594.35	426.38	422.17
Total	609.90	573.87	408.30	419.42
Intervention Year 1	**Grade 2 Read**	**Grade 2 Math**	**Grade 5 Read**	**Grade 5 Math**
HNTI (42-87% FARMS)	606.35 (+8.13)	574.28 (+11.33)	403.81 (+4.92)	414.64 (+5.44)
MNTI (20-40% FARMS)	617.93 (+1.55)	584.21 (+4.56)	415.59 (+2.32)	424.04 (+1.4)
LNNTI (5-20% FARMS)	630.81 (-0.55)	593.17 (-1.18)	424.58 (-1.8)	436.32 (+14.15)
Total	616.22 (+6.32)	580.61 (+6.74)	411.06 (+2.76)	421.44 (+2.02)
Intervention Year 2	**Grade 2 Read**	**Grade 2 Math**	**Grade 5 Read**	**Grade 5 Math**
HNTI (42-87% FARMS)	607.69 (+1.34/+9.47)	580.20 (+5.92/+17.25)	406.86 (+3.05/+7.97)	420.11 (+5.47/+10.91)
MNTI (20-40% FARMS)	623.26 (+5.33/+6.88)	591.64 (+7.43/+11.99)	422.99 (+7.4/+9.72)	431.26 (+7.22/+8.62)
LNNTI (5-20% FARMS)	637.08 (+6.27/+5.72)	605.98 (+12.81/+11.63)	433.02 (+8.44/+6.64)	447.22 (+10.9/+25.05)
Total	617.22 (+1/+7.32)	588.00 (+7.39/+14.13)	416.00 (+4.94/+7.7)	428.13 (+6.69/+8.71)

* District Proficiency Standard Scale Scores: Grade 2 Reading 609, Mathematics 567; Grade 5 Reading 405, Mathematics 392
** Only the HNTI Cohort received the intervention for Year 1 and Year 2

The *Highest Need Title I* cohort shows an increase of 8.13 points for Grade 2 reading in the first intervention year compared to the year prior to the full implementation of the *Early Childhood Intervention Program*. The following year, intervention year 2,

the *HNTI* cohort shows a gain of 1.34 points from the previous year and a 9.47 point gain compared to the pre-intervention year. For the mathematics achievement of the *HNTI* cohort, a gain of 11.33 point is seen in the first intervention year compared to the pre-intervention year. In the second intervention year, an increase of 5.92 points is seen, with a gain of 11.99 points compared to the pre-intervention year.

Gains are also seen in Grade 5, though comparisons to Grade 2 cannot be made since the assessment instruments are not the same or comparably scaled. In Grade 5, reading scores in the first intervention year show an increase over the pre-intervention year by 4.92 points and an increase in the next year by 3.05 points with a 7.92 point increase from the pre-intervention year to the second intervention year. Likewise, the mathematics scores of the *HNTI* cohort in Grade 5 show increases for the two treatment years. There was a 5.44 point increase from the pre-intervention year to the initial intervention year. The following year there was a similar increase of 5.47 points from the initial intervention year to the second intervention year and a 10.91 increase from the pre-intervention year to the second intervention year.

Gains were seen for the *Moderate Need Title I* cohort in Grade 2 and Grade 5 for the first intervention year of the *ECIP* compared to the pre-intervention year, but they were not to the extent of the gains seen by the *HNTI* cohort. However, the *Low Need Non-Title I* cohort experienced a decrease in three of four assessment scores during the first intervention year. There was decrease of .55 to 1.18 points in reading and mathematics with the exception of Grade 5 mathematics, were the cohort showed a gain of 14.15 points compared to the pre-intervention year. However, the *HNTI* cohort for intervention year two showed the least amount of gain of the three cohorts for the

intervention year two on all assessments compared to the initial implementation year. When comparing intervention year two to the pre-intervention year across the cohorts, the *HNTI* cohort showed the greatest amount of gain of the three intervention year two cohorts for Grade 2 reading and mathematics. The *HNTI* cohort also showed more gain (7.97 points) from the pre-intervention year to the second year of intervention compared to than the *LNNTI* cohort (6.64 points) in Grade 5 reading; the *MNTI* cohort had the greatest gain (9.72 points). The *HNTI* cohort also showed a greater gain in Grade 5 mathematics than the *MNTI* cohort when comparing year two to the pre-intervention year (10.91:8.62 points respectively); the *LNNTI* cohort had the greatest gain (25.05 points).

To further analyze the achievement assessment group mean scores of the cohort groups, statistical significance tests were done. Mean differences data are presented in Table 4.20. An examination of the multiple comparisons Tukey HSD poc hoc tests indicate statistically significant ($p>0.05$) differences for all the comparisons across the school years included in this study (Appendices D, E. F, H, J). When comparing the intervention year one kindergartners in Grade 2 and in Grade 5 to the pre-intervention kindergartners in Grade 2 and Grade 5, a decrease in the difference between the intervention cohort (*HNTI*) and the comparison cohorts (*MNTI* and *LNNTI*) is seen on every assessment at each grade level as indicated in Table 4.20. However, when making the same comparisons with the intervention year one kindergartners and the intervention year two kindergarteners at Grade 2 and Grade 5, a decline in gain is seen – much like a relapse in performance. Though the differences are not to the extent of the pre-treatment year, there is evidence of reversion.

Table 4.20 *Mean Differences*

	Pre-Intervention Year	Intervention Year 1	Intervention Year 2
GRADE 2			
CTBS READING			
HNTI (42-87% FARMS) - MNTI (20-40% FARMS)	-18.162	-11.571	-15.568
HNTI (42-87% FARMS) - LNNTI (5-20% FARMS)	-33.145	-24.451	-29.383
CTBS MATHEMATICS			
HNTI (42-87% FARMS) - MNTI (20-40% FARMS)	-16.702	-9.928	-11.440
HNTI (42-87% FARMS) - LNNTI (5-20% FARMS)	-31.407	-18.888	-25.775
GRADE 5			
DSA READING			
HNTI (42-87% FARMS) - MNTI (20-40% FARMS)	-14.385	-11.783	-16.132
HNTI (42-87% FARMS) - LNNTI (5-20% FARMS)	-27.489	-20.775	-26.154
DSA MATHEMATICS			
HNTI (42-87% FARMS) - MNTI (20-40% FARMS)	-13.446	-9.405	-11.444
HNTI (42-87% FARMS) - LNNTI (5-20% FARMS)	-32.972	-21.678	-27.102

** Only the HNTI Cohort received the intervention for Year 1 and Year 2

Question Four:

How does participation in the Early Childhood Intervention Program (ECIP) influence whether sixth grade students receive advanced mathematics placement and experience special education placement?

Table 4. 21 *Grade 6 Advanced Mathematics Class Placement*

	Pre-Intervention Year	Intervention Year 1	Intervention Year 2
HNTI (42-87% FARMS)	N = 352/1188 (29.6%)	N = 426/1157 (36.8%)	N = 425/1142 (37.2%)
MNTI (20-40% FARMS)	N = 299/650 (46%)	N = 291/580 (50.2%)	N = 318/541 (58.8%)
LNNTI (5-20% FARMS)	N = 248/445 (55.7%) 899/2283	N = 234/437 (53%) 951/2174	N = 266/388 (68.6%) 1009/2071

** Only the HNTI Cohort received the intervention for Year 1 and Year 2

Table 4.21 shows the enrollment trends of the kindergarten cohorts in Grade 6 advanced mathematics classes. The *Highest Need Title I* cohort showed an increase in enrollment in Grade 6 advanced mathematics from the pre-intervention year kindergarteners to the initial reform intervention year one kindergarteners by 7.2%, and a 0.4% increase from the first intervention year to the second intervention year kindergarten cohort. The *Moderate Need Title I* cohort showed a 4.2% increase from the pre-intervention year to intervention year one and an increase of 8.6% from intervention year one to intervention year two. The *Low Need Non-Title I* cohort showed a decrease of 2.7% of students enrolled in Grade 6 advanced mathematics from the pre-intervention year to intervention year one and an increase of 15.6% from intervention year one to the second year of the reform implementation. The *MNTI* cohort and the *LNNTI* cohorts increased enrollment in Grade 6 advanced mathematics 12.8% and 12.9% respectively from the pre-intervention year to the second implementation year, and the *HNTI* cohort increased enrollment 7.6%.

Table 4.22 *Grade 6 Advanced Mathematics Logistic Regression Pre-Intervention Year*

	N	Odds Ratio	B (Z Logit)	Exp(B)	Wald F (p value)
American Indian	11	52%	.083	1.086	.008 (.931)
Asian American	273	68%	.749	2.115	10.211 (.001)
African American	501	56%	.229	1.257	1.130 (.288)
White	768	63%	.551	1.734	7.511 (.006)
Hispanic	673				13.253 (.010)
HNTI Cohort	1160	57%	.301	1.351	2.404 (.121)
MNTI Cohort	629	62%	.470	1.600	5.678 (.017)
LNNTI Cohort	437				5.682 (.058)
Female	1092	58%	.306	1.359	4.882 (.027)
Male	1134				
Non-ELL	1746	59%	.357	1.428	2.917 (.088)
ELL	480				
Grade 5 DSA Math SS		52%	.073	1.076	437.150 (.000)
Grade 5 Days Present		50%	.009	1.009	1.095 (.295)

A logistic regression was conducted using the variables ethnicity, cohorts, gender, ELL, Grade 5 district state assessments, and days present in Grade 5. The ethnicities of American Indian, Asian American, African American, and White are compared to Hispanics. The *Highest Need Title I* cohort and the *Moderate Need Title I* cohort are compared to the *Low Need Non-Title I* cohort. Females are compared to males. Non-

English Language Learners are compared to English Language Learners. The performance on Grade 5 District State Mathematics Assessment using scale scores and the days present in the fifth grade are also used to make predictions for the probability of student enrollment in Grade 6 Advanced Mathematics B class or higher. Probability percentages were calculated from B (Z logit) values using the equation $P = e /1+ e$.

For the pre-intervention year, Table 4.22 indicates that of the racial groups, Asian American students (68%) and White students (63%) had a higher probability of being placed in advanced mathematics classes in grade six. The *Moderate Need Title I* groups had a 62% probability of advanced mathematics placement compared to the *LNNTI* cohort, and females are 58% as probable as males to receive advanced mathematics placement. Grade 5 DSA mathematics scale scores had a 52% probability of influencing placement in Grade 6 advanced mathematics. The other variables, American Indian, African American, the Highest Need Title I cohort, males, Non-ELL, ELL, and days present in school were non-significantly related to advanced mathematics placement.

Table 4.23 shows the probability of placement in Grade 6 advanced mathematics for the first year of the intervention. Like the pre-intervention year, Asian American (61%) and White students (59%) had the higher statistical probabilities of the racial groups of advanced mathematics placement. Of the cohort groups, The *Moderate Need Title I* groups had a 70% probability of Grade 6 advanced class placement. Grade 5 DSA mathematics scale scores had a 52% probability of influencing advanced mathematics class placement just as they did for the pre-intervention year.

Table 4.23 *Grade 6 Advanced Mathematics Logistic Regression Intervention Year 1*

	N	Odds Ratio	B (Z Logit)	Exp(B)	Wald F (p value)
American Indian	6	80%	1.384	3.992	1.160 (.281)
Asian American	282	61%	.463	1.569	4.680 (.031)
African American	491	52%	.069	1.071	.124 (.725)
White	652	59%	.366	1.422	3.637 (.057)
Hispanic	694				7.939 (.094)
HNTI Cohort	1128	58%	.342	1.408	3.530 (.060)
MNTI Cohort	565	70%	.844	2.326	19.295 (.000)
LNNTI Cohort	432				20.613 (.000)
Female	1033	46%	.173	.841	1.815 (.178)
Male	1092				
Non-ELL	1515	56%	.247	1.280	2.131 (.144)
ELL	610				
Gr 5 DSA Math SS		52%	.064	1.066	441.210 (.000)
Gr 5 Days Present		50%	.011	1.011	1.872 (.171)

Table 4.24 *Grade 6 Advanced Mathematics Logistic Regression Intervention Year2*

	N	Odds Ratio	B (Z Logit)	Exp(B)	Wald F (p value)
American Indian	4	93%	2.659	14.285	1.672 (.196)
Asian American	295	63%	.517	1.676	4.784 (.029)
African American	414	59%	.374	1.453	3.067 (.080)
White	630	59%	.349	1.417	2.599 (.107)
Hispanic	689				7.319 (.120)
HNTI Cohort	1116	49%	-.048	.953	.055 (.815)
MNTI Cohort	531	70%	.843	2.324	14.461 (.000)
LNNTI	385				28.682 (.000)
Female	990	51%	.048	1.050	.121 (.728)
Male	1042				
Non-ELL	1392	54%	.171	1.186	.889 (.346)
ELL	641				
Gr 5 DSA Math SS		52%	.079	1.083	443.139 (.000)
Gr 5 Days Present		50%	.014	1.014	2.035 (.154)

For the second year of the intervention, Asian American students were the only racial group to be statistically more likely than Hispanic students (reference group), with a 63% probability to receive Grade 6 advanced mathematics class placement. Again in the second intervention year, and consistent for the three years, the *Moderate Need Title I* cohort had a higher probability (70%) of advanced class placement in the sixth grade.

Grade 5 DSA mathematics scales scores (52%) continued to influence Grade 6 advanced mathematics placement.

Table 4.25 *Grade 6 Special Education*

Grade 6	HNTI (42-87% FARMS)	MNTI (20-40% FARMS)	LNNTI (5-20% FARMS)
Pre-Intervention Year	N=207/1226 (16.9%)	N=117/664 (17.6%)	N=52/457 (11.4%)
Intervention Year 1	N=169/1106 (15.3%)	N=82/562 (14.6%)	N=52/418 (12.4%)
Intervention Year 2	Insufficient data	Insufficient data	Insufficient data

As shown in Table 4.23, students in the *HNTI* and the *MNTI* cohorts demonstrated a decrease in the percentage receiving special education from the pre-intervention year to the initial intervention year. However, the *LNNTI* cohort shows an increase for these two years. Insufficient data was provided for an analysis of the second year of the intervention. This could possibly due to the collection of data prior to the exceptional children local, state, or federal headcount.

Achievement and placement findings were presented in this chapter. Overall, students in the *Highest Need Title I* cohorts who received the intervention demonstrated mean score gains on second and fifth grade mathematics and reading assessments. The findings of this study also indicate a reduction in special education placement and an increase in advanced mathematics class participation for the students in the *HNTI* intervention cohorts. A discussion of these findings is presented next in Chapter Five.

Chapter 5: Discussion, Implications, and Recommendations

As the nation continues to be perplexed by the issues of academic disparities among racial groups and social economic status; educators, policy makers, practitioners, and researchers remain committed to seeking viable solutions to these challenges. This study focuses on the influence of a district's early childhood education policy on the academic performance of low-income urban students who participated in the policy's reform intervention initiative. Through the examination of trend data, this study focuses on the mathematics achievement, reading achievement, and special education placement of nine cohorts in grades two and five. Ultimately, this study seeks to explore if the students who participated in the early childhood intervention reform made and sustained achievement gains and if the enrollment in grade six advanced mathematics classes increased proportionally for this population.

Edmond Gordon's (2001) tenets to support affirmative policy development for students who are underrepresented in the pool of high achievers include: early, continuous and progressive exposure to rigorous pre-academic and academic teaching and learning that should begin with high levels of language, literacy, and numeracy development; rich opportunities to learn through pedagogical practices traditionally thought to be of excellent quality; diagnostic, customized, and targeted assessment, instructional and remedial interventions; academic acceleration and content enhancement; the use of relational data systems to inform educational policy and practice decisions; explicit socialization of intellect to multiple cultural contexts; and explication of tacit knowledge, meta-cognition, and meta-componential strategies (p. 3). In light of Gordon's ideology, attention is given to the District's Early Childhood Education policy reform

initiative components: full-day kindergarten, curriculum revision, professional development, diagnostic assessments, parental involvement, smaller classes, extended learning opportunities, and an instructional management system. The underpinnings of Gordon's and the District's policy are included in the discussion that follows.

Study Findings

When looking holistically at the findings of this study, several salient conclusions emerge overall from an analysis of the data across the years:

- Students in the *Highest Need Title I* cohort consistently show mean score gains on second and fifth grade mathematics and reading assessments for the first and second year of the full intervention implementation compared to the students in *HNTI* cohort the year prior to the reform.
- Students in the *HNTI* cohort demonstrate greater mean score gains than the two comparisons cohorts the initial year of the reform and collectively over two years compared to the pre-intervention year for mathematics and reading in both grade two and grade five. An exception to these gains is grade five mathematics gains for the *Low Need Non-Title I* cohort.
- Mean score differences indicate a reduction in the differences between the scores of the *HNTI* cohort and the *MNTI* and *LNNTI* cohorts for the intervention years compared to the pre-intervention year at grades two and five; this was also evident the second year with the exception of fifth grade reading when comparing the *HNTI* cohort to *MNTI* cohort.

- Increases in advanced mathematics class participation occurred for students in the $HNTI_1$ and $HNTI_2$ cohorts who received the intervention compared to the students in the $HNTI_0$ cohort who did not receive the intervention.
- Reduction in special education participation is evident for the students in the $HNTI_1$ and $HNTI_2$ cohort for grades five and six, but not for grade two.

The cohorts for this study were purposefully selected to represent the demographic zoning of the District. Hence, the cohorts reflect the racial/ethnic and socio-economic groups that comprise the District's polarized demographic areas. Because of this, a more in-depth discussion of the research findings on the salience of race/ethnicity and socio-economic status in relation to academic achievement towards advanced class placement is presented here.

Impact of Early Education Intervention

The *Highest Need Title I* cohorts who received the early childhood intervention showed mean score gains in reading and mathematics at the second and fifth grades. In fact, when the two intervention years are combined, the *HNTI* cohorts show greater gains in reading and mathematics at both grade levels than the comparison cohorts, with the exception of grade five mathematics. While there may be different explanations for this increase, one possible explanation may reside in the District's policy that moved these students from half-day to full-day kindergarten (Appendix B). Wortham (2002) suggests that a move from half-day kindergarten to full-day kindergarten better prepares children for elementary school by teaching needed basic skills in kindergarten. Further, scholars offer that full-day kindergarten provides the time to implement a more formal curriculum to accelerate the academic achievement that is required for elementary school

standardized tests (Hough & Bryde,1996; Maeroff, 2006; Walston & West, 2004; Wortham, 2002). Froebel's first kindergarten structure offered children a school day that included play and direct instruction. The District's *Early Childhood Intervention Program (ECIP)* provides full-day kindergarten that includes a revised curriculum.

Ramey and Ramey (2004) suggest that the incorporation of the scientific evidence about what really works with high-risk children produces measurable benefits. The revised curriculum for the *ECIP* is comprised of research-based early literacy and early numeracy components (Appendices M, N, O). The District's reading curriculum includes the domains of Whitehurst and Lonigan's (1998) early literacy model containing phonemic awareness. Researchers and practitioners agree that phonemic awareness and cueing strategies are foundational skills that should be included in early reading instruction (Griffith & Olsen, 1992; Kelly, 1997). The District's revised curriculum also includes a balanced literacy approach which encompasses direct instruction, whole group and small instruction, whole language and phonics approaches (Kelly, 1997). Carbo (1997) asserts a balanced literacy approach responds to different learning styles. Most importantly for the population of students in the *HNTI* cohorts, Freppon and Dahl (1998) content that a balanced literacy approach is designed on a theoretical base that is cultural and requires the inclusion of children's backgrounds, interests, strengths, and needs.

The early numeracy component of the District's curriculum is directly aligned to the *2000 National Council of Mathematics Standards (NCTM)*, which are designed to support the belief that early education must build on the principle that all children can learn. The *2000 NCTM Standards* reflect an awareness that children are likely to enter school with varied levels of mathematical understanding and that some children will need

additional support to prevent starting school at a disadvantage. For this reason, the *2000 NCTM Standards* require high quality education and experiences in kindergarten through grade 2. Number and Geometry Standards are at the core of mathematics during the early years: numbers and their relationships, operations, place value, and attributes of shapes, while utilizing computers and calculators to explore number and pattern, focus on problem-solving process, and investigate realistic applications much like Froebel's first curriculum. Additionally, Bruner supports the teaching of fundamental ideas of the disciplines in kindergarten. Clements, Sarama, and DiBase (2004) purport that children at risk of school failure need to build a basic knowledge that provide for later learning to prevent mathematical failure.

Regression analyses for reading and mathematics at the second and fifth grade levels reveal the potential negative impact English Language Learners, African Americans, Hispanics, and American Indians could have on reading and mathematics assessment scores. In light of this and the District's intent for accelerated achievement for the young learners and preparation for late rigorous coursework, continued targeted attention must be given to these populations.

The *Highest Need Title I* cohorts are comprised largely of students of color – almost half of the students are Hispanic and one quarter are African American for the two intervention years studied. Thus, the findings for the *HNTI* cohorts are heavily influenced by Hispanics. Statistical analyses of the dataset indicate lower performances for African American and Hispanic students. Consequently, these students are projected to likely reduce the achievement assessment mean scores for reading and mathematics. The racial disparities reported by many scholars (Artiles & Trent, 1994; Ford, 1998; Ford & Harris,

1999; Gay, 1997; Gordon, 2001; Hilliard, 1992; Jencks & Phillips, 1998; National Alliance of Black School Educators, 2003; Noguera & Akom, 2000; Office of Civil Rights, 1994; Patton, 1998; Peng & Hill, 1995; Russo & Talbert-Johnson, 1997) continue to exist among the children in this district, whether or not they have received the early intervention. Many factors contribute to the achievement disparities that exist among racial groups. Since this district has designed a research-based reform initiative that seeks to address many of these influences, refining and intensifying the components of the intervention could further narrow the noted disparities.

Though the *Highest Need Title I* cohorts show the greatest mean score gains in reading and mathematics, group mean scores for this cohort are still less than those for the two comparison cohorts. The question of what is considered a reasonable difference is between the high-need students and their more advantaged peers is a fair question. Some policy-makers, researchers, educators, practitioners, and even parents would beg the question: Is it fair to expect the same performance from students in resource-rich environment that is expected from students in disadvantaged environments?

Influence of Early Learning on Later Achievement

Proficiency and fluency of informal knowledge builds the foundation that serves as the prerequisite to the formal knowledge for children (Clements, Sarama, & DiBiase, 2004). Bruner's philosophy that foundational skills should be taught early in the child's educational experience supports his belief that there should be a relationship between what a student learns at an early age and what is learned at a later age. Like Bruner, Froebel based his kindergarten curriculum on the skills he deemed necessary for later school achievement. Moreover, a more vigorous curriculum at early ages, that formally

teaches academic subjects in kindergarten, is deemed the impetus for improving achievement and academic performance (Morrison, 2000). Priest et al., (2001) suggest focusing on a set of conceptual and skill-based prerequisites to effectively instruct and support students with diverse learning needs is of the utmost importance.

As previously discussed, the *Highest Needs Title I* cohorts that received the intervention showed greater group means score gains than the comparison cohorts that did not participate in the reform initiative. Likewise, group means score gains are seen when comparing the disadvantaged children who did not participate in the intervention reform to those who did. In addition to the group means score gains of the students in the *HNTI* during the intervention years, these students demonstrated improved benchmark performance. Students who participated in the *ECIP* demonstrated increases at the proficient and advanced levels of the District's criterion-referenced benchmarks for mathematics and reading performances. Albeit other factors beyond those associated with the District's policy could influence the participants' academic performance, the findings of this study show the participants experienced academic gains at the fifth grade level that could potentially be related to the *Early Childhood Intervention Program.*

Current research shows that an early mastery of prerequisite skills is correlated to later successful school achievement and performance. Adams (2001) states early knowledge of the alphabet and alphabetic principles are keys to later reading success. Bond and Dykstra (1967) assert that teaching children to read with a variety of materials, methods, and combination of approaches is more effective. Balanced literacy infuses skills and strategies in context across disciplines (Weaver, 1998). Likewise, Aubrey (2001) contends early mathematics performance can be linked to later achievement when

the necessary competencies for student success are identified and if lacking, could place the child at risk of failure. The *2000 NCTM Standards* for kindergarten through grade two include experiences that are requirements for children's long-term success in learning and development. The *Standards* are not separate topics for study but are interwoven strands designed to support the learning of connected mathematical ideas. With Number and Geometry at the core, the other Content Standards including Algebra, Measurement, and Data Analysis and Probability, contribute to and are learned in conjunction with the Number and Geometry Standards (NCTM, 2000).

Special Education Placement

Despite second grade group means score gains for the participants in the *Highest Need Title I* cohorts during the intervention years, there was a slight increase in the number of these children who received special education services compared to the children in the *HNTI* who did not participate in the intervention program. This increase in the percentage of students receiving special education does not coincide with the findings for the Carolina Abecedarian Project and the Chicago Child-Parent Center which both report a reduction in special education for its participants who were African American (Campbell & Ramey, 1995; Reynolds & Temple, 1998).

While the District should be queried to definitively explain the increase in special education services at grade two, this increase may have resulted from a more intensive focus on the students who could benefit from more individualized interventions to remediate special achievement issues earlier. Thus, students who demonstrated more severe academic deficits could have been identified sooner for special education services

with the intent to eradicate their academic deficiencies and establish the basic skill levels they would need for later school success.

Unlike the second grade special education placement for the *HNTI* intervention cohorts' participants, at fifth and sixth grades, there is a decrease in the percentage of the students who participated in the *ECIP* full intervention reform and placement in special education for the two intervention years. Though the decreases are slight when comparing the two intervention years of the *HNTI* cohorts to the pre-intervention year *HNTI* cohort, there is evidence of decrease in special education placement for these groups composed mostly of students of color.

This decrease in percentage of students receiving special education services coincides with the findings for the Carolina Abecedarian Project and the Chicago Child-Parent Center's report of a reduction in special education for its participants (Campbell & Ramey, 1995; Reynolds & Temple, 1998). Further, the deceases in special education services at the fifth and sixth grade could potentially indicate an elimination of some of the students who needed special education services earlier in second grade to be more successful later in school. Thus, earlier special education services could have the potential to address the needs of educationally challenged students and return them to the mainstream environment. Perhaps this is an attempt to eradicate tracking and equitably educate racially and ethnically diverse learners as discussed by Harris, et al (2004).

Towards Advanced Class Placement

One of the first steps to increase the number of racially and ethnically diverse learners in advanced placement is to assure all students have early access to opportunities to learn challenging curricula (Gandara, 2004). Studies have concluded that early

intervention programs have been linked to better school achievement and higher educational attainment (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Campbell & Pungello, 2000; Luster & McAdoo, 1976; Ou, 2005; Reynolds, Temple, & Ou, 2003; Sweinhart, 2003). The achievement trend data for this study indicate reduced group mean score differences between the *HNTI* cohorts and the *MNTI* and *LNNTI* cohorts for the initial intervention compared to the pre-intervention year at grades two and five. Reduced group mean score differences were also seen between the intervention cohorts and the comparison cohorts when the second year of the intervention was compared to the pre-intervention year, though not to the same extent. The initial intervention year *HNTI* cohort gains are greater than the two comparisons cohorts compared to the pre-intervention year for mathematics and reading in both grade two and grade five, with the exception of grade five mathematics. Gains are evident for the year two *HNTI* cohort but not to the extent of the initial year. However, when the two intervention years are combined, the *HNTI* cohorts show greater gains than the comparison cohorts for second grade reading and mathematics. The *HNTI* cohorts showed greater gains than the *LNNTI* cohorts for fifth grade reading and the *MNTI* cohorts for fifth grade mathematics when the intervention years were combined.

Of the possible explanations for the reduction in mean score differences among the cohort groups is the offering of fundamental skill earlier as suggested by Bruner. Bruner's spiral curriculum and scaffolding approaches build continuously on skills introduced and learned early in life. These interventions support the mastery of prerequisite skills in reading and mathematics, which contribute to continued and sustained academic achievement gains (Clements, Sarama, & DiBiase, 2004; Priest et al.,

2001). The participants for this study represent diverse cultural and economic backgrounds and started kindergarten with varied skill sets and requisite knowledge. Another consideration is the appeal by scholars like Gordon (2001) and Gandara (2004) to the education enterprise to embark upon a deliberate effort to develop academic abilities in a broad range of students who have been deprived of resources and who are underrepresented among high achievers.

Gordon also purports that an explication of meta-cognition and meta-component strategies are critical to the academic development of low-performing, underserved students. According to Jensen (1996) brain-based instruction has significantly increased the academic success of diverse learners. Jensen contends purposeful programs to enrich the learners' brain must include stimulating and challenging learning environments that include problem-solving, critical thinking, relevant projects, and complex activities. The objective of the District's curriculum is to be challenging, based on research and best practices, and to integrate all disciplines by design. The curriculum framework supports this objective with the inclusion of an environment (materials, activities, space) that promotes inquiry and project-based learning (Appendix O). The curriculum framework schedule offers opportunities for students to set goals. Gardner and Checkley (1997) assert that students develop and display intrapersonal intelligence when offered the opportunity to form a mental model of self, make a decision about viable courses of action, and make determinations about what to avoid and what to gravitate towards.

The participants in the *Early Childhood Intervention Program* demonstrate gains in achievement on second and fifth grade assessments. Though gains were seen for the comparison cohorts as well, the reductions in the differences of the mean scores across

the cohorts indicate a reduction in the achievement disparity for the cohorts studied. While this reduction in the achievement disparity could have many explanations, attributing the academic gains of the *ECIP* participants to the structure of the District's curriculum framework components is possible. The curriculum offers students the research-based early literacy and numeracy skills to support continued accelerated learning beyond second grade. It also includes materials, activities, strategies, instruction, assessments, and environments that are designed to meet the cultural differences that are characteristic of the targeted population for this study. Froebel designed specific materials and tools to support his structured curriculum. To ascertain the extent to which any one of the curriculum framework components influences the reductions in mean score differences entails further investigation and study.

Equitable Practices for Advanced Class Identification

Another crucial step to increasing the representation of African and Hispanic students in advanced classes is to carefully consider policies and procedures. Harris et al. (2004) assert procedural and policy issues contribute to the underrepresentation of diverse students in gifted education. Advanced mathematics class placement data for this study indicate students in the *Highest Need Title I* cohorts who participated in the intervention reform increased enrolled in advanced mathematics classes from the pre-intervention year. These findings concur with Gordon's (2001) appeal for academic acceleration and content enhancement. Gandara's (2004) student-centered approach suggests high achievement for Latinos and African Americans result from the provision of interventions in the lives of individual students with very specific and targeted instructions and guidance. The *ECIP* reform program interventions are designed to raise

achievement, reduce drop-out rates, and support students to proceed to college. With this approach, underserved students are typically exposed to curricula with educational rigor, and support is increased to maximize their potential, as opposed to experiencing dead-end curricular tracks. Gandara's position is that capable youngsters flourish intellectually and academically if provided appropriate curriculum and support to access that curriculum.

The District's accelerated mathematics trajectory is designed to identify students who show capabilities to accelerate. In as early as first grade, the curricular framework is designed in a tiered, two-fold manner with a range of performance indicators provided such that students who demonstrate the potential to excel are exposed to accelerated standards for that grade level (Appendix P). This holds true as students continue to progress through the elementary years. Hence, students who are in the sixth grade have the opportunity to take Math B, which is seventh grade mathematics, or higher mathematics courses (Appendix Q). This "curriculum compacting" allows the students to experience the next grade level courses while in his/her current grade level. The course of study for an accelerated trajectory includes Math A (sixth grade mathematics taken in fifth grade or possibly a lower grade), Math B (seventh grade mathematics taken in six grade or possibly a lower grade), algebra or Investigations into Mathematics (taken in sixth grade or possibly a lower grade); students continuously progress from algebra into geometry, algebra II, and other higher level mathematics classes.

To participate in a higher/advanced level course (such as Math B in grade 6), multiple factors are considered (District Mathematics Program Specialist, personal communication, January 8, 2008). The acceleration determination includes input from the teacher, the parents, and the student. The students' performances on local and state

assessments, as well as their achievement in the classroom, are among the considerations for acceleration. Though no one indicator precludes a student from being accelerated, students who perform at the advanced benchmark level and those whose benchmark level performance is at the upper end of proficient are generally considered for acceleration.

When reviewing the data for grade 6 advanced mathematics class enrollment and those for grade 5 advanced benchmark performance, more students are enrolled in advanced mathematics classes at the sixth grade level than those that score advanced performance on grade 5 mathematics benchmark assessments. This finding is evident across the three cohort groups for the data for fifth grade mathematics proficiency and sixth grade Math B enrollment. The increased difference in the number of students enrolled in grade six advanced mathematics beyond those scoring advanced performance on grade five benchmark assessments indicates the use of more than just grade five advanced performance benchmark data for consideration and placement in grade six mathematics acceleration classes.

Advanced Mathematics Classes Enrollment

A logistic regression to predict the probability of students in the *Highest Need Title I* cohort who would be enrolled in Advanced Mathematics B or higher advanced classes in Grade 6 indicates *HNTI* students are least likely to have this educational experience compared to the students in the more affluent advantaged cohorts. Likewise, the probability of the ethnic groups that largely comprise the *Highest Need Title I* cohort, African American and Hispanic, are predicted less likely to be placed in advanced mathematics than Whites who mostly comprise the *Moderate Need Title I* and *Low Need Non-Title I coho*rts. However, for the second year of the treatment, African American and

White students both have the same probability of advanced mathematics enrollment. This sameness is due to the decrease in probability for White students from the pre-intervention year and an increase for African American students from the pre-intervention year.

Despite unimpressive and diminishing comparative odds, students in the *Highest Need Title I* cohort demonstrated increased enrollment in Advanced Mathematics B and higher advanced mathematics classes in Grade 6. This increase is an attest to the influence of the accelerated start provided by the *Early Childhood Intervention Program* and the provision of perquisite skills that lead to later and sustained achievement throughout the elementary years and into middle school. Even though the logistic regression predictions do not indicate encouraging probabilities for increased enrollments for the students in *Highest Need Title I* cohort or great expectations for this population of students to experience advanced mathematics at increasing rates in Grade 6; more disadvantaged students are accessing these opportunities to learn at a higher level.

Gandara (2004) contends that students who are placed in low-end courses are not prepared initially to tackle both a rigorous curriculum and the strong competition posed by fellow students who arrive to formal school well prepared, and who are socially and economically advantaged. To offset the inequities at the onset of formal school, educational leverage is needed during this time of rapid brain growth; stimulation and novelty are essential to laying down the foundations for later learning (Jensen, 1998). For this reason, it is extremely critical to provide underprivileged students with the earliest access to opportunities for brain stimulation to activate accelerated learning while the brain is in its most receptive and malleable mode – the early formative years.

While the percentages of the *ECIP* students enrolled in Math B increased for both of the two intervention years, their percentage of participation by cohort did not equal that of the *MNTI* or *LNNTI* cohorts. This leaves one to ponder whether or not there is more work to be done by the District to continue to accelerate the achievement of its young learners. Arguably, no school district will ever be at a place where it can believe it has met the colossal challenge to accelerate the learning of all children. Striving to find new and better ways to teach all children so that none is left behind is and will continue to be the on-going work of the education enterprise. It is clear that the achievement for African American, Hispanic, and low income students in this Mid-Atlantic district is increasing. The findings of this study show laudable effort by the District. However, the work is not done. A district willing to undertake an aggressive reform initiative such as the one studied here is surely amenable to taking the next steps.

Overall, the findings of this study contribute to the body of literature that suggests early foundational literacy and numeracy skills are essential to continued and sustained achievement. This study's findings show that acquisition and mastery of perquisite skills by second grade promote the demonstration of higher knowledge in fifth grade. These findings also contribute to the ongoing search to identify viable early childhood policy that will assist in accelerating the academic achievement of youngsters who enter school behind their same-age peers, who are often left behind, and who contribute to the disparities in achievement among racial and socioeconomic groups. Additionally, the findings of this study bring attention to students' culture and diverse learning needs as critical curricular components. Finally, the findings of this study contribute to the very small body of previous research on accelerated early learning and later advanced class

placement. In light of these findings, there must be continued dialogue among all stakeholders on the opportunities afforded to all children to learn at the optimal level.

Reflections on the District's Policy

Despite the fact that the District's reform initiative has evidence of positive outcomes for some low-income students of color, some scholars like Richard Rothstein (2004) argue that the success of some lower-class students proves nothing about schools' power to close the achievement gap. In his article, *Even the Best Schools Can't Close the Race Achievement Gap*, Rothstein claims that "some schools' successes are statistical flukes – their high test scores last for only one year, in only one grade and in only one subject". (p.2). Rothstein further contends that some schools succeed with lower-class children by defining high achievement at a level low enough such that all students reach it. Arguably, Rothstein presents credible positions, but these claims are refutable.

Of the most concern is Rothstein's position on social class and achievement. He emphasizes that schools cannot make up for deficits like poor health care, poor oral hygiene, more lead poisoning, more asthma, poorer nutrition, inadequate pediatric care, more exposure to smoke, accompanied by less literate homes with fewer words spoken, over reprimanding and under encouraging words. He asserts that to improve lower-class children's learning, an amelioration of the social and economic conditions of their lives is necessary. While Rothstein presents a viable argument, it is not novel; and it has been a constant challenge since the Coleman Report (1966) alarmed the nation in the 1960s by concluding that family background, not the school was the major determinant of student achievement. Coleman further espoused that regardless of the method of instruction, factors such as poverty or a parent's lack of education prevail. Other scholars, like Ron

Edmonds (1979), differed in opinion from Coleman and started one the first major initiatives to inform the education enterprise on the role of the school with his *Correlates of Effective Schools.*

As a result of the Coleman report, "compensatory education" programs provided mainly through Title I of the Elementary Secondary Education Act were created. In Edmonds' view, these programs taught low-income children to learn in ways that conformed to most schools' preferred ways of teaching and focused on changing students' behavior to compensate for their disadvantaged backgrounds. Hence, these programs made no effort to change school behavior (Edmonds, 1979). Edmonds and other researchers took the Coleman Report to task and developed a body of research that supported the premise that all children can learn; and the school controls the factors necessary to assure student mastery of the core curriculum. This research defined the foundation for the *Effective Schools Movement*. Edmonds' work also recognized that in addition to the school's role to assure students function adequately in school; the family plays a critical role in determining whether or not students flourish in school. The *Effective Schools Movement* initiated its work with the school as the unit of change, it later clarified that school improvement resulting in increased student achievement could only be sustained with strong district support.

As suggested by the work of Ron Edmonds, the early childhood education reform initiative for this study is a district policy initiative with a focus on changing school practices not the child's behavior to compensate for his or her disadvantage. Seeking to accelerate the learning of economically disadvantaged students, it includes not only school level factors but also a parent component. Edmund Gordon's list of interventions

presented throughout these discussions speaks specifically to an affirmative development policy that places accountability on the education community to develop academic abilities in a broad range of students who have historically been deprived of resources and who are underrepresented in the pool of academic high achievers.

The *Early Childhood Intervention Program* designed by the District includes many of Gordon's tenets and a parent involvement component. The parent involvement component not only increases communication with parents in their "home-spoken" language, but it also informs parents of the expectations of the revised curriculum, provides redesigned family-friendly report cards, and provides home activities to support the daily classroom instruction. Moreover, the *ECIP's* curriculum framework assessment component includes a system for gathering information from the family that it is used in the overall evaluation of students (Appendix O). Froebel's kindergarten program included a home-school component that trained parents to practice curriculum activities with the aim to bridge the relationship between the school and the home.

The literature states that during the social revolutions of the 1960s, an important shift occurred in early childhood education from custodial care programs to those that fostered intellectual functioning (Brewer, 2001; Hamilton, Roach, & Riley, 2003; Hewes, 1995; & Schwartz, 1997). Like Schwartz's (1997) discussion on the exacerbating results of early age parental teaching deprivation on mainstream society entry, Lee and Burkam (2002) report that such initial inequalities can be reduced. They further contend a key goal of education is to assure every child has the chance to excel in school and life. Success as adults, college attendance, professions, and salaries are contingent upon children's success in school. One attempt to offset the lack of parental teaching and

encourage a collaborative relationship between teachers and families is the parent-teacher partnership accreditation standard of the National Association for the Education of Young Children (NAEYC) (Hamilton, Roach, & Riley, 2003). The NAEYC also includes the awareness of ethnic difference in its revised Developmentally Appropriate Practices position statement and guidelines.

An awareness of ethnic and cultural differences is another critical element when seeking to afford all children access to educational opportunities for inclusion in the pool of academic high achievers. Contrary to Coleman's belief that regardless of the instruction, poverty and parents' lack of education prevail, Gandara (in Gardner, 2006) asserts that schools should build on the strengths students have, including their home-language skills while focusing on intensive academic English instruction. Along this vein, Conchas (in Gardner, 2006) offers that the culture of the school and small supportive learning communities that consist of high expectations from teachers and a rigorous and relevant curriculum lead to the success of students of color regardless of parental income and educational background.

The District's curriculum framework includes a multicultural environment with culturally relevant materials and activities and assessments that are culturally sensitive. Further, District documents state that the curriculum is designed to build on student strengths, to differentiate instruction, and to maximize the use of technology (Appendix O). According to Willms (1999):

> "Two important indicators of success of a society are the level of literacy of its children and youth, and the extent of disparities in literacy skills among children and youth with differing characteristics and family backgrounds. These indicators

> are markers of how investments of material, social and cultural resources made during the past decade have been translated into skills and competencies in the present generation: they denote the success of families, schools, and communities in producing a literate society" (p. 72).

With the accrued wealth of knowledge to meet the needs of young children at risk of school failure, designing early childhood education reform initiatives and developing interventions that to meet these students' needs should not be problematic. Coupling Froebel's contributions on a structured kindergarten curriculum with Bruner's early learning ideas should produce early education programs that enhance children's early opportunities to learn. Such programs are critical to early childhood education since social stratification in education outcomes increases as children move through the grades in school.

According to Lee and Burkam (2002), the increase in social inequalities occur mainly because of differentiation in educational experiences that begin as early as first grade with reading groups, special education, and retention. The differences extend through elementary school as ability grouping, special education, and gifted and talented programs continue. By high school, the differences are evident by formal and informal tracking and advanced placement classes.

Wyner, Bridgeland, and Diiulio's (2007) report, *Achievement Trap: How America is Failing Millions of High-Achieving Students From Lower-Income Families,* states 3.4 million K-12 students who live in low-income homes rank in the top quartile academically. These high-achieving students "defy the stereotype that poverty precludes high academic performance and that lower-income and low academic achievement are

inextricably linked – they demonstrate that economically disadvantaged children can learn at the highest levels" (p. 1). Wyner and his colleagues further contend that these remarkable young people are hidden from public view and absent from public policy and instead of being recognized and encouraged they are caught in the "achievement trap" – where educators, policymakers, and the public assume they are capable of taking care of themselves academically, when they are not.

Despite economic and cultural challenges, parental limitations, and all of the implications associated with poverty, some of the students who participate in the *Early Childhood Intervention Program* demonstrate gains on second grade assessments and sustain those gains through fifth grade assessments. Consequently, increasing numbers of students from the highest need schools are participating in the District's advanced level mathematics classes after participating in the *ECIP*.

The District reports its use of research on how the brain learns to plan and design the accelerated mathematics trajectory (District Mathematics Program Specialist, personal communication, January 8, 2008). Scholars like Whimbey, Aronsn, Fried, and Good, and Jensen attest to the use of instruction in problem solving, metacognition, and strategic thinking to increase academic abilities in students from preschool to college. The findings from the works of these scholars demonstrate sustained achievement from elementary school to middle school and support research on brain-based instructional practices. This study's findings of higher numbers of low-income students performing at advanced levels in reading and mathematics and subsequent increased enrollment in advanced mathematics classes confirm the conclusions of these researchers.

Access to Opportunities to Learn

The early childhood programs discussed in Chapter 2 are designed to support the achievement of students from low-economic environments and demonstrate positive long-term outcomes for the program participants. These early intervention programs assisted the participants in having access to educational and social opportunities they may not have otherwise experienced. Like the programs previously discussed, the District's early intervention reform is designed to produce long-term success and serve as the gateway to opportunities.

The findings of this study of a district's early childhood policy reform initiative suggest a full-day kindergarten model with a curriculum that focuses on early literacy and numeracy, includes parents in the program as partners, acknowledges different cultures, and recognizes children come to kindergarten with different skill sets and levels can produce higher achievement. Moreover, the results suggest that achievement gains are cumulative and sustained throughout the elementary years such that disadvantaged students have access to advanced mathematics classes in grade six. Believing that no one factor in isolation can be attributed to the findings of this study, the other features of the *Early Childhood Intervention Program* included in the full reform initiative (professional development, diagnostic assessments, smaller classes, extended learning opportunities, and an instructional management system) are also considered contributing factors for the findings of this study.

Because of the District's willingness to focus on the early learning of its students in the highest poverty schools, the opportunity to off-set poverty and gain access to learn at higher levels is afforded to the group of students who are often "left behind" at the

starting gate. This early access opportunity has resulted in more disadvantaged students having higher levels of academic proficiency at grade two and at grade five, fewer disadvantaged students receiving special education at grades five and six, and more disadvantaged students having the opportunity to participate in advanced mathematics classes at grade six. These students now have the opportunity to follow a mathematical trajectory that gives them access to algebra, which gives access to higher level mathematics classes in high school, which prepares students to potentially perform higher on the Scholastic Aptitude Test for mathematics, and which gives these students a competitive edge for acceptance in colleges and universities. The District's decision to give students in the highest poverty schools ***early access*** to opportunities to learn gives these often "left behind" students ***later access*** to opportunities for success.

> *"We can, whenever and wherever we choose, successfully teach all children whose schooling is of interest to us. We already know more than we need to do that. Whether or not we do it must finally depend on how we feel about the fact that we haven't so far."*
>
> Dr. Ron Edmonds, Founder, Effective Schools Movement

Recommendations for Further Study

The findings of this study suggest several implications for continued examination of the various outcomes and the influences of the policy components on the results:

First, additional data of at least three years prior to the implementation of the policy reform should be analyzed to provide a trend data analysis of previous achievement outcomes for comparison to the achievement following the intervention implementation. This analysis will provide a broader scope and a more comprehensive

look at the achievement of the sample population prior to pre-intervention. While the data suggest an influence of the intervention on achievement, this analysis would better support the impact of the intervention.

Secondly, continuous study of cohorts entering kindergarten since this sampling will provide the District with on-going evaluations of the policy intervention and continuous assessments of student achievement relative to the reform initiative. Such evaluations will monitor the enrollment of students in Math B and other advanced placement classes to determine if students from disadvantaged and low-income environments are keeping pace with their more advantaged peers. Also, data analysis beyond the sixth grade would allow for continued measures of the sustainability of the reform initiative and the placement of students in academically challenging classes. Moreover, continuing to follow and collect data on the first two cohorts beyond the high school years provide answers to the questions on the impact of the accelerated reform initiative on life choices and contributions to society made by the participants.

Thirdly, an in-depth analysis of teachers, administrators, and district personnel perspectives on policy decision making, design, and implementation would give voice to the data and support the questions around the specifics of the policy's components such as the amount and use of professional development, and the use of the instructional management and diagnostic assessment data collection to inform policy evaluations. A qualitative analysis could investigate the fidelity of the intervention implementation and curriculum framework components. It could offer important information specific to individual schools that could be critical to high performance for all students, as this study was not a school-by-school investigation.

Next, continued analyses of the dataset for this study would help to delineate to what extent each intervention strategy contributes to the findings of this study. The District's further scrutiny of the reform initiative's components could potentially increase desired outcomes. Knowing the components that are most beneficial to the desired outcomes would assist the provision of meaningful educational experiences to assist the highest need schools. Specifically, since research supports strong family relationships and the inclusion of the child's home and culture in the school and instructional process, it would be beneficial to know how significant these components are to the outcomes.

Key to the success and extended outcomes of the early childhood program studies presented was parent participation and support. An assessment of family and school relationships to determine the level of parental satisfaction and comfort offers the opportunity to enhance the communication. Assuring parents and families are comfortable with and fully understand the role they should assume in the education of their child removes the barriers that could keep the child from optimal performance. Also, fortifying the intensity of the home-school relations provides a seamless sense of security for the student. Parents, students, teachers, administrators, and school personnel are all critical to bridging both the world of home and the world of school for the student. Though the reform initiative speaks to home-school relations, the extent to which this presently occurs within the District could not be determined from this study.

Essential to bridging the student's life at home and his or her life at school is the inclusion of the students' culture in the school. Bruner's thoughts on socio-culture clarify the importance of transferring the sense of security children establish in their own domains to the classrooms in which they must learn. Including the "familiar" provides the

"tools" for students build with and build upon. Determining to what extent the recognition and inclusion of culture is infused into learning is critical. Additionally, recognizing that diverse learners have diverse learning styles is essential to planning and implementing instruction.

Finally, research should be conducted that includes an analysis of the pre-kindergarten services and programs provided by the District. Knowledge of the impact that these programs and services have on readiness for kindergarten provides valuable information as to how to best structure policy and perhaps increase the number of students who make gains as they progress through the grades, and those who are accelerated. The *Early Childhood Intervention Program* is a four-year, pre-kindergarten through second grade reform. This study focused on the kindergarten reform initiative. Pre-kindergarten is offered to income-eligible children to prepare them with the foundational knowledge and skills necessary for success in kindergarten and beyond. Classes are available for three and four year old children. Additionally, the District has early child care and family centers for children ages birth to five and their families. A study of a seamless continuum from the pre-kindergarten to middle school advanced class enrollment and beyond would inform the early childhood education field as it seeks to educate all children and leave no children behind, while aspiring to narrow achievement disparities among racial and socio-economic groups.

In light of the findings of this study that students in the *Early Childhood Intervention Program* are demonstrating and sustaining academic gains, participating less in special education, increasing academic acceleration, and participating more in advanced mathematics class, additional examinations of the sample and dataset could

further enlightening all stakeholders who are grappling over effective early childhood education programming.

Conclusion

This study examined longitudinal data to explore the influence of an early childhood education policy reform on achievement gains and sustainability of high-need students, and on these students' participation in advanced mathematics classes and special education The findings indicate students who participate in the reform intervention show academic gains when compared to students attending the same schools prior to the intervention and those who did not receive the intervention attending less needy schools. The District can apply the findings to their continued efforts to improve the educational opportunities afforded to the students in the highest need schools. In addition, the findings may help policymakers in the design of early childhood education reform. Further evaluation of the District's policy could be beneficial to ensure desired outcomes of the reform increases the number of high-need schools' student successes as they move through the grades in school.

Early Childhood Education Program Studies

Type of Program	Methods Used	Program Design/ Study Design	Main Findings Outcomes	Contributing Factors	Comments (Importance/Limitations)
Carolina Abecedarian Project – intensive EC program for poor African American families and infants through elementary. *Campbell & Ramey, 1995*	Experimental study using a 2X2 design contrasting control and treatment groups of matching subjects, randomly assigned to 4 cohorts	Framework included measures of cognitive functioning, social development and health. Children in the experimental group received systematic educational intervention in a day care setting beginning in the first half of the first year of life and continuing up to age 5. Intervention was provided for the first three years in elementary for those assigned to this phase of the treatment.	Study discovered that treatment group showed: different patterns of intellectual development through mid-adolescence; significant difference in test performance maintained 10 yrs. in math & reading; significantly lower special ed. placements and retentions.	Optimal time for intervention was during preschool years. Parents of treated youngsters served on the day care center's advisory. Parents were counseled by the medical staff about health and development. Attitudes of elementary school teachers toward the program may have influenced their perceptions of its graduates. Other factors in the home, schools, and communities influenced outcomes.	Study poses questions that are answered by addressing long-term measures of intellectual development, achievement, and school progress. Some comparative data to similar ECE programs offered. Policy implications stressing the importance of high quality ECE for impoverished children given.
Carolina Abecedarian Project *Campbell & Pungello, 2000*	Experimental study comparing students who received 5 years of treatment to control group. Linear pattern analysis done.	Randomized trial of early children educational intervention provided in a full-time child care setting year round for 5 years beginning in infancy for children from low-income families. Treatment also included pediatric care (on site) and educational support for the first 3 years in elementary school. Teacher and child-directed activities included.	Findings indicate treatment group scored higher on cognitive test at age 21, significantly higher math scores, and more likely to be in school at age 21. Real life benefits included educational attainments, skilled employment, self-sufficiency, parenthood, self-reported substance abuse, violence, and crime appeared to have no significant impact.	Curriculum was designed especially for the project. Language and pre-literacy development were given special emphasis. There was virtually no turnover in the teacher staff. Parents had to agree in advance to the conditions of random assignment. Strong parent participation.	Findings strongly support the trend to extend Head Start downward into infancy. Reveals the long-term benefits that can be achieved from a program so intensive and long lasting. . Original participants were available for the long-term follow-up studies. Major funding was continuous.
Carolina Abecedarian Project Campbell et al., 2001	Hierarchical linear models were used to test the longitudinal hypotheses in this study.	Effects of early educational intervention on patterns of cognitive and academic development among poor, minority, children were examined. Early treatment was full-time, high-quality, educational care from infancy to age 5. Cognitive test scores were collected between the ages of 3 and 21 years and	This study indicates that intensive early childhood education can have lasting effects on cognitive and academic development. Treated children, on average, attained higher scores on both cognitive and academic tests, with moderate to large treatment effect sizes observed through age 21. Preschool cognitive gains	Treatment began in early infancy. Other contributing factors included the duration of the treatment (five years before kindergarten), the program's intensity (8-hour days, year-round), the service delivery model (primarily child focused), and the characteristics of the children	Long-term findings from the Abecedarian Project are important because the study was a scientifically rigorous, prospective randomized trial. The design allows more confidence in attributing the findings to early childhood intervention rather than to uncontrolled

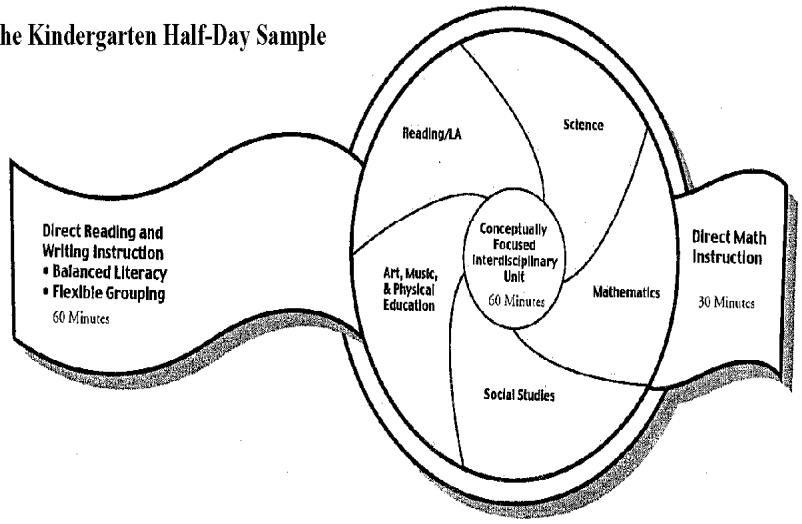
Type of Program	Methods Used	Program Design/ Study Design	Main Findings Outcomes	Contributing Factors	Comments (Importance/Limitations)
		academic test scores from 8 to 21 years analyzed.	accounted for a substantial portion of treatment differences in the development of reading and math skills.	served (more mentally developed heterogeneous group).	differences in the treated and control groups. Low attrition increases confidence in the findings.
Chicago Child-Parent Center and Extension Program – federally initiated comprehensive education and family support services early childhood interventions *Reynolds & Temple, 1998*	Study analyzes longitudinal data sets using a two-equation, simultaneous estimation method and employing a model for each outcome which applies a bivariate classical regression	The program provides half-day preschool, half-day or all-day kindergarten and all-day service in the follow-on program in primary grades 1-3. The program provides up to 6 years of continuous intervention. It emphasizes the major features: comprehensive services, parental involvement in school, and a child-centered focus on reading/literacy skills. Comprehensive services include: health and nutrition, coordinate parent-school-community services, in-service teacher training, and emphasis on reading, mathematics and language uses.	Results show that participants through 2nd and 3rd grade, on average, outperformed children whose participation in the program ended after kindergarten. Longer-term effects of the follow-on program at age 13 showed significantly higher reading achievement in grade 7, but not higher math achievement. Children in the follow-on program were significantly less likely to be retained by 8th grade and were less likely to receive special ed. services.	Student participation in the full compensatory program through the second or third grade. Funds for teachers to purchase instructional materials and supplies. Smaller class sizes and greater adult services. Parent programs, parent rooms, parent volunteers. Other factors include: difficulty of controlling for differences between groups, frequent mobility, incomplete participation, missing test scores.	Study provides rare longitudinal evidence for the positive benefits of extended early childhood intervention. Findings indicate large-scale public service programs can be effective in enhancing educational success for economically disadvantage children despite relatively modest funding and fewer human resources. Study corrects for common censoring or sample selection problem when there is attrition from the original sample.
Chicago Child-Parent Centers *Reynolds, Temple, & Ou, 2003*	Match group quasi-experimental study using a structural equation model to analyze longitudinal data sets and to estimate causal relations	The study of a cohort of 1,539 low-income children and a comparison group is an ongoing investigation of a variety of individual, family, and school factors to children's well-being especially those that are modifiable. It includes an extensive involvement of teachers, managers, and principals. Interventions include: early interventions, parent involvement, structured language/basic skills learning approach, health and social services, and program continuity between preschool and early school-age years.	Findings provided strong evidence that large-scale, public, early interventions can enhance children's well being: school readiness and achievement, remedial education, family support behavior, juvenile delinquency, and educational attainment. The study also found that the benefits of the program participation exceed the costs – participants' increased earning capacity, savings to the criminal justice system, and reductions in expenditures for school remedial services.	Parents may attend general equivalency diploma (GED) classes. Parent training includes consumer education, nutrition, personal development, health and safety, and homemaking arts. Enhanced quality of the post-program school and community environments. Notably, motivational advantage and social adjustment made smaller contributions to effects, but they did not contribute to the model fit.	Findings can be generalized to children and families with similar socio-economic characteristics, primarily low income children in urban areas. Limitation – study formally began during the kindergarten year, the amount of data during the preschool year is limited.

Type of Program	Methods Used	Program Design/ Study Design	Main Findings Outcomes	Contributing Factors	Comments (Importance/Limitations)
Chicago Child-Parent Centers *Ou, 2005*	Study uses a sample from longitudinal data sets. Structural equation, main-effect, and cumulative mediator models were used to examine path coefficients. Covariates were included in all the models.	The program is a center-based early intervention that serves 3- and 4-year-olds who come from families in high-poverty neighborhoods that are not being served by Head Start or other early intervention programs. Services are provided from preschool to early elementary. The components include parental involvement, comprehensive services, and a child-centered focus on the development of reading/language skills. It has no uniform curriculum. Each site tailors its program to children's needs through a unified philosophy of literacy and a common core of activities that include individualized instruction, small group activities, and field trips.	Findings indicate that environmental factors such as family and school, as well as personal characteristics that maybe affected by the intervention, play important roles in predicting educational outcomes. Outcomes for five hypotheses (cognitive advantage, social adjustment, motivation, family support, and support) were given. Though there were no significant differences between the control and the comparison groups in more than half of the attributes studied, there were significant differences for some individual and family characteristics such as gender, parents' education, and family size.	Program assumes parental involvement is an important socializing force in young children's development. Parents are required to be involved in the center for at least one half-day per week (interacting with other parents in the parent resource room, accompanying classes on field trips, attending school events and parent-teacher meeting ...). Comprehensive services include: home visits, health screening, nursing services, free and reduced priced meals, and services to improve home environments and to promote stability.	Study reviews and compares the pathways of effects of high quality early intervention on later outcomes from similar programs. Includes discussion of two theories that help to explain how early childhood education intervention could affect long term outcomes.
High/Scope Perry Preschool – designed for African American 3-4 year old children living in poverty *Luster & McAdoo, 1996*	Data analysis included zero-order correlations, bivariate, multiple, and hierarchical multiple regressions. Path analysis was also used.	Conceptual model guiding the study was influenced by earlier studies and several case studies. Study included 5 cohorts. Primary outcome of interest was educational attainment at the age of 27. Children were assessed regularly on measures of cognitive ability during the elementary years. Behavior inventories were also given. Maternal involvement in the school was rated by kindergarten teachers. Extensive data on the family of origin were	Findings indicate children's cognitive competence and academic motivation in kindergarten were predictive of achievement test scores in elementary grades. Children who were relatively well adjusted in kindergarten ultimately attained higher levels of education. Results indicate that children's characteristics at the time they enter school affect their developmental pathways, though little information is available about	The influence of parents on what the child brings to the school settings; parents value on education attainment; the relationship between parent expectations; and parents' discipline style are to be considered. Also, the potential influence on educational attainment for women in early childbearing.	Study examines factors other than preschool that contributed to the success in the area of education; both individual differences among the participants at the time of school entry and the characteristics of their families

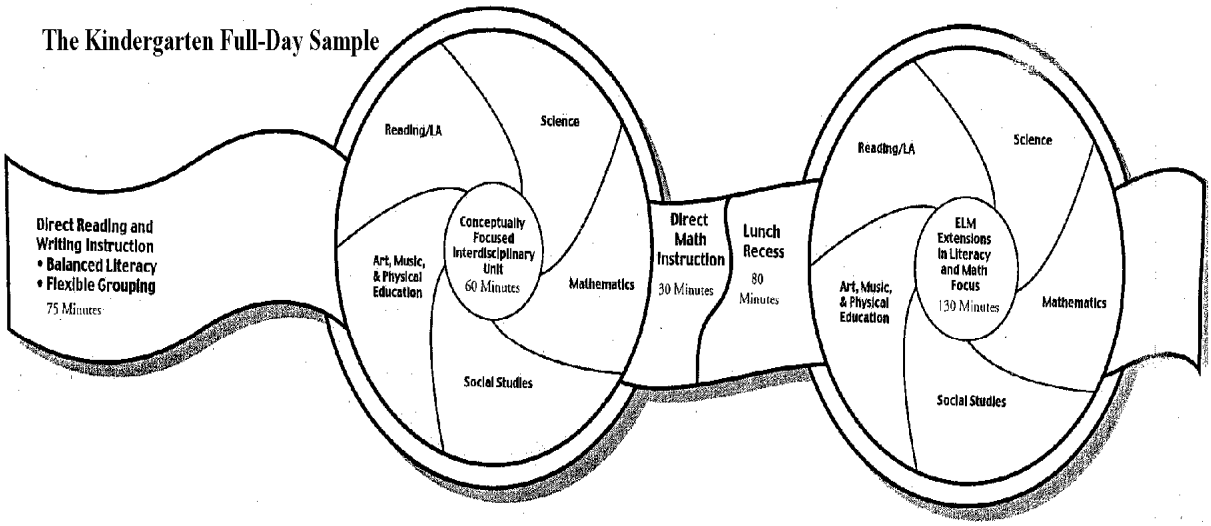
Type of Program	Methods Used	Program Design/ Study Design	Main Findings Outcomes	Contributing Factors	Comments (Importance/Limitations)
		collected at 15 and parents' involvement. The adolescents were also interviewed on parental style at age 15. Other information gathered included adolescents ' study habits, teenage childbearing, and strong influences on the participants.	the antecedents of those characteristics. There was some support of the hypothesis that families who were more involved in school would have children who were more successful students, but the evidence was mixed.		
High/Scope Perry Preschool, Carolina Abecedarian Project, and Chicago Child-Parent Centers *Schweinhart, 2003*	Three program study analysis - analyzes data from a comprehensive set of data using a causal model	Looks at the studies to answer challenging questions of generalizability: Is it important to simply confirm the finding that high-quality preschool education has long-term positive effects of children living in poverty. Is it important to identify what conditions of context, population, and treatment lead to positive long-term effects and what conditions do not? Is it important to determine whether the effective conditions are robust and easily achieved or tenuous and difficult to achieve?	Study suggests that preschool program experience improves children's intellectual performance at school entry, which in turn improves their school motivation, makes them less like to require special education and improves their literacy. Improved motivation enables children to increase their highest year of schooling, which leads in adulthood to higher monthly earnings and less chance of being arrested for criminal activities. The studies suggest that high-quality programs for young children produce significant long-term benefits because they provide children with significant learning opportunities, involve parents as full partners with teachers, and provide teachers with curriculum training.	The study had little attrition. The data was analyzed after each phase of the study. The scientific strength of the study is its ability to assess preschool effects many years later. The program group was defined not by the intent to receive the program but rather by actually receiving it. Differences in the research design of the three studies (2 experimental, 1 quasi-experimental).	Presents provocative differences between the three studies. They also share a growing number of characteristics. Show what Head Start and other ECE programs can achieve if designed and implemented effectively. The study bears testimony to the potential of lasting effects of good preschool programs on young children at risk of school failure living in poverty.

Appendix B

The Kindergarten Half-Day Sample



The Kindergarten Full-Day Sample



Appendix C

Cohort	# of Schools	Grade	Year	Data
42-87% FARMS – Year 0	17			
(K: 1999-2000, Title I Schools,		2	2001-2002	CTBS Mathematics Reading Achievement; Special Education
Pre-Intervention/ Treatment)		5	2004-2005	DSA Reading Levels and Scores*; Special Education
		6	2005-2006	Math B or higher placement; Special Education
20-40% FARMS – Year 0				
(K: 1999-2000, Title I Schools,	9	2	2001-2002	CTBS Mathematics Reading Achievement; Special Education
Non- Intervention)		5	2004-2005	DSA Reading Levels and Scores*; Special Education
		6	2005-2006	Math B or higher placement; Special Education
5-20% FARMS – Year 0				
(K: 1999-2000, Non-Title I Schools,	9	2	2001-2002	CTBS Mathematics Reading Achievement; Special Education
Non- Intervention)		5	2004-2005	DSA Reading Levels and Scores*; Special Education
		6	2005-2006	Math B or higher placement; Special Education
42-87% FARMS – Year 1	17			
(K: 2000-2001, Title I Schools,		2	2002-2003	CTBS Mathematics Reading Achievement; Special Education
Intervention/Treatment)		5	2005-2006	DSA Reading Levels and Scores*; Special Education
		6	2006-2007	Math B or higher placement; Special Education
20-40% FARMS – Year 1	9			
(K: 2000-2001, Title I Schools,		2	2002-2003	CTBS Mathematics Reading Achievement; Special Education
Non-Intervention)		5	2005-2006	DSA Reading Levels and Scores*; Special Education
		6	2006-2007	Math B or higher placement; Special Education
5-20% FARMS – Year 1	9			
(K: 2000-2001, Non-Title I Schools,		2	2002-2003	CTBS Mathematics Reading Achievement; Special Education
Non- Intervention)		5	2005-2006	DSA Reading Levels and Scores*; Special Education
		6	2006-2007	Math B or higher placement; Special Education
42-87% FARMS – Year 2	17			
(K: 2001-2002, Title I Schools,		2	2003-2004	CTBS Mathematics Reading Achievement; Special Education
Intervention/Treatment)		5	2006-2007	DSA Reading Levels and Scores*; Special Education
		6	2007-2008	Math B or higher placement; Special Education
20-40% FARMS – Year 2	9			
(K: 2001-2002, Title I Schools,		2	2003-2004	CTBS Mathematics Reading Achievement; Special Education
Non-Intervention)		5	2006-2007	DSA Reading Levels and Scores*; Special Education
		6	2007-2008	Math B or higher placement; Special Education
5-20% FARMS – Year 2	9			
(K: 2001-2002, Non-Title I Schools,		2	2003-2004	CTBS Mathematics Reading Achievement; Special Education
Non- Intervention)		5	2006-2007	DSA Reading Levels and Scores*; Special Education
		6	2007-2008	Math B or higher placement; Special Education

* DSA Reading data will be reported in Performance Levels (Basic, Proficient, Advanced) and Scale Scores

** Other demographic (race/ethnicity, gender), English as a second language, free and reduced meals, and attendance data will also be collected.
Data for English as a second language and free and reduced meals will be reported at the kindergarten status.

Appendix D

Multiple Comparisons

Dependent Variable: CTBS_read_ss (grade 2)

	(I) School grouped three cohort	(J) School grouped three cohort	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSI	Title I Intervention	Title I Non-interven	-18.162*	1.894	.000	-22.60	-13.72
		Non-title I non-intervention	-33.145*	2.127	.000	-38.13	-28.16
	Title I Non-interven	Title I Intervention	18.162*	1.894	.000	13.72	22.60
		Non-title I non-intervention	-14.983*	2.368	.000	-20.54	-9.43
	Non-title I non-intervention	Title I Intervention	33.145*	2.127	.000	28.16	38.13
		Title I Non-interven	14.983*	2.368	.000	9.43	20.54
Scheffe	Title I Intervention	Title I Non-interven	-18.162*	1.894	.000	-22.80	-13.52
		Non-title I non-intervention	-33.145*	2.127	.000	-38.35	-27.94
	Title I Non-interven	Title I Intervention	18.162*	1.894	.000	13.52	22.80
		Non-title I non-intervention	-14.983*	2.368	.000	-20.78	-9.18
	Non-title I non-intervention	Title I Intervention	33.145*	2.127	.000	27.94	38.35
		Title I Non-interven	14.983*	2.368	.000	9.18	20.78
Dunnett T3	Title I Intervention	Title I Non-interven	-18.162*	1.967	.000	-22.86	-13.46
		Non-title I non-intervention	-33.145*	2.052	.000	-38.05	-28.24
	Title I Non-interven	Title I Intervention	18.162*	1.967	.000	13.46	22.86
		Non-title I non-intervention	-14.983*	2.386	.000	-20.69	-9.28
	Non-title I non-intervention	Title I Intervention	33.145*	2.052	.000	28.24	38.05
		Title I Non-interven	14.983*	2.386	.000	9.28	20.69

*. The mean difference is significant at the .05 level.

Appendix E

Multiple Comparisons

Dependent Variable		(I) School grouped in three cohort	(J) School grouped in three cohort	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
CTBS_read_ss (grade 2)	Tukey HSD	Title I Intervention	Title I Non-intervention	-11.571*	1.896	.000	-16.02	-7.12
			Non-title I non-intervention	-24.451*	2.109	.000	-29.40	-19.51
		Title I Non-intervention	Title I Intervention	11.571*	1.896	.000	7.12	16.02
			Non-title I non-intervention	-12.880*	2.381	.000	-18.46	-7.30
		Non-title I non-intervention	Title I Intervention	24.451*	2.109	.000	19.51	29.40
			Title I Non-intervention	12.880*	2.381	.000	7.30	18.46
	Scheffe	Title I Intervention	Title I Non-intervention	-11.571*	1.896	.000	-16.22	-6.93
			Non-title I non-intervention	-24.451*	2.109	.000	-29.61	-19.29
		Title I Non-intervention	Title I Intervention	11.571*	1.896	.000	6.93	16.22
			Non-title I non-intervention	-12.880*	2.381	.000	-18.71	-7.05
		Non-title I non-intervention	Title I Intervention	24.451*	2.109	.000	19.29	29.61
			Title I Non-intervention	12.880*	2.381	.000	7.05	18.71
	Dunnett T3	Title I Intervention	Title I Non-intervention	-11.571*	1.932	.000	-16.19	-6.95
			Non-title I non-intervention	-24.451*	2.111	.000	-29.50	-19.40
		Title I Non-intervention	Title I Intervention	11.571*	1.932	.000	6.95	16.19
			Non-title I non-intervention	-12.880*	2.435	.000	-18.70	-7.06
		Non-title I non-intervention	Title I Intervention	24.451*	2.111	.000	19.40	29.50
			Title I Non-intervention	12.880*	2.435	.000	7.06	18.70
CTBS_math_ss (grade 2)	Tukey HSD	Title I Intervention	Title I Non-intervention	-9.928*	2.200	.000	-15.09	-4.77
			Non-title I non-intervention	-18.888*	2.443	.000	-24.62	-13.16
		Title I Non-intervention	Title I Intervention	9.928*	2.200	.000	4.77	15.09
			Non-title I non-intervention	-8.959*	2.762	.003	-15.44	-2.48
		Non-title I non-intervention	Title I Intervention	18.888*	2.443	.000	13.16	24.62
			Title I Non-intervention	8.959*	2.762	.003	2.48	15.44
	Scheffe	Title I Intervention	Title I Non-intervention	-9.928*	2.200	.000	-15.32	-4.54
			Non-title I non-intervention	-18.888*	2.443	.000	-24.87	-12.90
		Title I Non-intervention	Title I Intervention	9.928*	2.200	.000	4.54	15.32
			Non-title I non-intervention	-8.959*	2.762	.005	-15.72	-2.20
		Non-title I non-intervention	Title I Intervention	18.888*	2.443	.000	12.90	24.87
			Title I Non-intervention	8.959*	2.762	.005	2.20	15.72
	Dunnett T3	Title I Intervention	Title I Non-intervention	-9.928*	2.221	.000	-15.24	-4.62
			Non-title I non-intervention	-18.888*	2.441	.000	-24.73	-13.05
		Title I Non-intervention	Title I Intervention	9.928*	2.221	.000	4.62	15.24
			Non-title I non-intervention	-8.959*	2.789	.004	-15.63	-2.29
		Non-title I non-intervention	Title I Intervention	18.888*	2.441	.000	13.05	24.73
			Title I Non-intervention	8.959*	2.789	.004	2.29	15.63
MSA_Gr5_Math_ss (grade 5 scale score)	Tukey HSD	Title I Intervention	Title I Non-intervention	-9.405*	2.054	.000	-14.22	-4.59
			Non-title I non-intervention	-21.678*	2.277	.000	-27.02	-16.34
		Title I Non-intervention	Title I Intervention	9.405*	2.054	.000	4.59	14.22
			Non-title I non-intervention	-12.273*	2.570	.000	-18.30	-6.25
		Non-title I non-intervention	Title I Intervention	21.678*	2.277	.000	16.34	27.02
			Title I Non-intervention	12.273*	2.570	.000	6.25	18.30
	Scheffe	Title I Intervention	Title I Non-intervention	-9.405*	2.054	.000	-14.44	-4.37
			Non-title I non-intervention	-21.678*	2.277	.000	-27.25	-16.10
		Title I Non-intervention	Title I Intervention	9.405*	2.054	.000	4.37	14.44
			Non-title I non-intervention	-12.273*	2.570	.000	-18.57	-5.98
		Non-title I non-intervention	Title I Intervention	21.678*	2.277	.000	16.10	27.25
			Title I Non-intervention	12.273*	2.570	.000	5.98	18.57
	Dunnett T3	Title I Intervention	Title I Non-intervention	-9.405*	2.046	.000	-14.30	-4.51
			Non-title I non-intervention	-21.678*	2.290	.000	-27.16	-16.20
		Title I Non-intervention	Title I Intervention	9.405*	2.046	.000	4.51	14.30
			Non-title I non-intervention	-12.273*	2.575	.000	-18.43	-6.11
		Non-title I non-intervention	Title I Intervention	21.678*	2.290	.000	16.20	27.16
			Title I Non-intervention	12.273*	2.575	.000	6.11	18.43
MSA_Gr5_Read_ss (grade 5 scale score)	Tukey HSD	Title I Intervention	Title I Non-intervention	-11.783*	1.646	.000	-15.64	-7.92
			Non-title I non-intervention	-20.775*	1.822	.000	-25.05	-16.50
		Title I Non-intervention	Title I Intervention	11.783*	1.646	.000	7.92	15.64
			Non-title I non-intervention	-8.992*	2.058	.000	-13.82	-4.17
		Non-title I non-intervention	Title I Intervention	20.775*	1.822	.000	16.50	25.05
			Title I Non-intervention	8.992*	2.058	.000	4.17	13.82
	Scheffe	Title I Intervention	Title I Non-intervention	-11.783*	1.646	.000	-15.82	-7.75
			Non-title I non-intervention	-20.775*	1.822	.000	-25.24	-16.31
		Title I Non-intervention	Title I Intervention	11.783*	1.646	.000	7.75	15.82
			Non-title I non-intervention	-8.992*	2.058	.000	-14.03	-3.95
		Non-title I non-intervention	Title I Intervention	20.775*	1.822	.000	16.31	25.24
			Title I Non-intervention	8.992*	2.058	.000	3.95	14.03
	Dunnett T3	Title I Intervention	Title I Non-intervention	-11.783*	1.646	.000	-15.72	-7.85
			Non-title I non-intervention	-20.775*	1.861	.000	-25.23	-16.32
		Title I Non-intervention	Title I Intervention	11.783*	1.646	.000	7.85	15.72
			Non-title I non-intervention	-8.992*	2.108	.000	-14.03	-3.95
		Non-title I non-intervention	Title I Intervention	20.775*	1.861	.000	16.32	25.23
			Title I Non-intervention	8.992*	2.108	.000	3.95	14.03

*. The mean difference is significant at the .05 level.

Appendix F

Multiple Comparisons

Dependent Variable		(I) School grouped in three cohort	(J) School grouped in three cohort	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
CTBS_read_ss (grade 2)	Tukey HSD	Title I Intervention	Title I Non-intervention	-15.568*	1.875	.000	-19.97	-11.17
			Non-title I non-intervention	-29.383*	2.091	.000	-34.29	-24.48
		Title I Non-intervention	Title I Intervention	15.568*	1.875	.000	11.17	19.97
			Non-title I non-intervention	-13.815*	2.382	.000	-19.40	-8.23
		Non-title I non-intervention	Title I Intervention	29.383*	2.091	.000	24.48	34.29
			Title I Non-intervention	13.815*	2.382	.000	8.23	19.40
	Scheffe	Title I Intervention	Title I Non-intervention	-15.568*	1.875	.000	-20.16	-10.97
			Non-title I non-intervention	-29.383*	2.091	.000	-34.51	-24.26
		Title I Non-intervention	Title I Intervention	15.568*	1.875	.000	10.97	20.16
			Non-title I non-intervention	-13.815*	2.382	.000	-19.65	-7.98
		Non-title I non-intervention	Title I Intervention	29.383*	2.091	.000	24.26	34.51
			Title I Non-intervention	13.815*	2.382	.000	7.98	19.65
	Dunnett T3	Title I Intervention	Title I Non-intervention	-15.568*	1.900	.000	-20.11	-11.03
			Non-title I non-intervention	-29.383*	2.097	.000	-34.40	-24.37
		Title I Non-intervention	Title I Intervention	15.568*	1.900	.000	11.03	20.11
			Non-title I non-intervention	-13.815*	2.419	.000	-19.60	-8.03
		Non-title I non-intervention	Title I Intervention	29.383*	2.097	.000	24.37	34.40
			Title I Non-intervention	13.815*	2.419	.000	8.03	19.60
CTBS_math_ss (grade 2)	Tukey HSD	Title I Intervention	Title I Non-intervention	-11.440*	2.150	.000	-16.48	-6.40
			Non-title I non-intervention	-25.775*	2.395	.000	-31.39	-20.16
		Title I Non-intervention	Title I Intervention	11.440*	2.150	.000	6.40	16.48
			Non-title I non-intervention	-14.335*	2.729	.000	-20.73	-7.94
		Non-title I non-intervention	Title I Intervention	25.775*	2.395	.000	20.16	31.39
			Title I Non-intervention	14.335*	2.729	.000	7.94	20.73
	Scheffe	Title I Intervention	Title I Non-intervention	-11.440*	2.150	.000	-16.70	-6.18
			Non-title I non-intervention	-25.775*	2.395	.000	-31.64	-19.91
		Title I Non-intervention	Title I Intervention	11.440*	2.150	.000	6.18	16.70
			Non-title I non-intervention	-14.335*	2.729	.000	-21.02	-7.65
		Non-title I non-intervention	Title I Intervention	25.775*	2.395	.000	19.91	31.64
			Title I Non-intervention	14.335*	2.729	.000	7.65	21.02
	Dunnett T3	Title I Intervention	Title I Non-intervention	-11.440*	2.092	.000	-16.44	-6.44
			Non-title I non-intervention	-25.775*	2.568	.000	-31.92	-19.63
		Title I Non-intervention	Title I Intervention	11.440*	2.092	.000	6.44	16.44
			Non-title I non-intervention	-14.335*	2.863	.000	-21.18	-7.49
		Non-title I non-intervention	Title I Intervention	25.775*	2.568	.000	19.63	31.92
			Title I Non-intervention	14.335*	2.863	.000	7.49	21.18
MSA_Gr5_Math_ss (grade 5 scale score)	Tukey HSD	Title I Intervention	Title I Non-intervention	-11.144*	1.872	.000	-15.53	-6.75
			Non-title I non-intervention	-27.102*	2.112	.000	-32.06	-22.15
		Title I Non-intervention	Title I Intervention	11.144*	1.872	.000	6.75	15.53
			Non-title I non-intervention	-15.958*	2.386	.000	-21.55	-10.36
		Non-title I non-intervention	Title I Intervention	27.102*	2.112	.000	22.15	32.06
			Title I Non-intervention	15.958*	2.386	.000	10.36	21.55
	Scheffe	Title I Intervention	Title I Non-intervention	-11.144*	1.872	.000	-15.73	-6.56
			Non-title I non-intervention	-27.102*	2.112	.000	-32.28	-21.93
		Title I Non-intervention	Title I Intervention	11.144*	1.872	.000	6.56	15.73
			Non-title I non-intervention	-15.958*	2.386	.000	-21.80	-10.11
		Non-title I non-intervention	Title I Intervention	27.102*	2.112	.000	21.93	32.28
			Title I Non-intervention	15.958*	2.386	.000	10.11	21.80
	Dunnett T3	Title I Intervention	Title I Non-intervention	-11.144*	1.911	.000	-15.71	-6.57
			Non-title I non-intervention	-27.102*	2.103	.000	-32.13	-22.07
		Title I Non-intervention	Title I Intervention	11.144*	1.911	.000	6.57	15.71
			Non-title I non-intervention	-15.958*	2.427	.000	-21.76	-10.15
		Non-title I non-intervention	Title I Intervention	27.102*	2.103	.000	22.07	32.13
			Title I Non-intervention	15.958*	2.427	.000	10.15	21.76
MSA_Gr5_Read_ss (grade 5 scale score)	Tukey HSD	Title I Intervention	Title I Non-intervention	-16.132*	1.739	.000	-20.21	-12.05
			Non-title I non-intervention	-26.154*	1.962	.000	-30.76	-21.55
		Title I Non-intervention	Title I Intervention	16.132*	1.739	.000	12.05	20.21
			Non-title I non-intervention	-10.022*	2.217	.000	-15.22	-4.82
		Non-title I non-intervention	Title I Intervention	26.154*	1.962	.000	21.55	30.76
			Title I Non-intervention	10.022*	2.217	.000	4.82	15.22
	Scheffe	Title I Intervention	Title I Non-intervention	-16.132*	1.739	.000	-20.39	-11.87
			Non-title I non-intervention	-26.154*	1.962	.000	-30.96	-21.35
		Title I Non-intervention	Title I Intervention	16.132*	1.739	.000	11.87	20.39
			Non-title I non-intervention	-10.022*	2.217	.000	-15.45	-4.59
		Non-title I non-intervention	Title I Intervention	26.154*	1.962	.000	21.35	30.96
			Title I Non-intervention	10.022*	2.217	.000	4.59	15.45
	Dunnett T3	Title I Intervention	Title I Non-intervention	-16.132*	1.786	.000	-20.40	-11.86
			Non-title I non-intervention	-26.154*	1.953	.000	-30.83	-21.48
		Title I Non-intervention	Title I Intervention	16.132*	1.786	.000	11.86	20.40
			Non-title I non-intervention	-10.022*	2.270	.000	-15.45	-4.59
		Non-title I non-intervention	Title I Intervention	26.154*	1.953	.000	21.48	30.83
			Title I Non-intervention	10.022*	2.270	.000	4.59	15.45

*. The mean difference is significant at the .05 level.

Appendix G

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	607.026	.758		800.461	.000		
	TitleINonIV	13.485	1.335	.141	10.100	.000	.916	1.092
	NonTitleINonIV	26.814	1.487	.251	18.038	.000	.916	1.092
2	(Constant)	587.275	4.061		144.607	.000		
	TitleINonIV	13.138	1.334	.137	9.848	.000	.914	1.095
	NonTitleINonIV	26.501	1.485	.248	17.850	.000	.914	1.094
	days present in school - kindergar	.120	.024	.066	4.950	.000	.996	1.004
3	(Constant)	613.840	4.136		148.412	.000		
	TitleINonIV	4.815	1.323	.050	3.639	.000	.833	1.200
	NonTitleINonIV	11.273	1.558	.106	7.238	.000	.745	1.341
	days present in school - kindergar	.068	.023	.038	2.964	.003	.984	1.016
	FEMALE	9.069	1.062	.108	8.542	.000	.999	1.001
	AFAM	-24.682	1.527	-.246	-16.164	.000	.682	1.466
	HISP	-22.943	1.671	-.257	-13.731	.000	.454	2.201
	ASAM	-3.703	1.849	-.029	-2.002	.045	.733	1.364
	AMIND	-31.166	10.755	-.037	-2.898	.004	.990	1.010
	English Language Learner	-11.623	1.429	-.126	-8.135	.000	.657	1.521

a. Dependent Variable: CTBS_read_ss (grade 2)

Appendix H

Multiple Comparisons

Dependent Variable: CTBS_math_ss (grade 2)

	(I) School grouped in three cohort	(J) School grouped in three cohort	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Title I Intervention	Title I Non-intervention	-16.702*	2.104	.000	-21.63	-11.77
		Non-title I non-intervention	-31.407*	2.363	.000	-36.95	-25.87
	Title I Non-intervention	Title I Intervention	16.702*	2.104	.000	11.77	21.63
		Non-title I non-intervention	-14.705*	2.631	.000	-20.87	-8.54
	Non-title I non-intervention	Title I Intervention	31.407*	2.363	.000	25.87	36.95
		Title I Non-intervention	14.705*	2.631	.000	8.54	20.87
Scheffe	Title I Intervention	Title I Non-intervention	-16.702*	2.104	.000	-21.85	-11.55
		Non-title I non-intervention	-31.407*	2.363	.000	-37.19	-25.62
	Title I Non-intervention	Title I Intervention	16.702*	2.104	.000	11.55	21.85
		Non-title I non-intervention	-14.705*	2.631	.000	-21.15	-8.26
	Non-title I non-intervention	Title I Intervention	31.407*	2.363	.000	25.62	37.19
		Title I Non-intervention	14.705*	2.631	.000	8.26	21.15
Dunnett T3	Title I Intervention	Title I Non-intervention	-16.702*	2.219	.000	-22.01	-11.40
		Non-title I non-intervention	-31.407*	2.344	.000	-37.01	-25.80
	Title I Non-intervention	Title I Intervention	16.702*	2.219	.000	11.40	22.01
		Non-title I non-intervention	-14.705*	2.790	.000	-21.38	-8.03
	Non-title I non-intervention	Title I Intervention	31.407*	2.344	.000	25.80	37.01
		Title I Non-intervention	14.705*	2.790	.000	8.03	21.38

*. The mean difference is significant at the .05 level.

Appendix I

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	577.253	.876		659.049	.000		
	TitleINonIV	10.570	1.544	.097	6.848	.000	.916	1.091
	NonTitleINonIV	22.131	1.717	.182	12.888	.000	.916	1.091
2	(Constant)	553.772	4.664		118.725	.000		
	TitleINonIV	10.146	1.542	.093	6.579	.000	.914	1.095
	NonTitleINonIV	21.749	1.715	.179	12.684	.000	.914	1.094
	days present in school - kindergar	.142	.028	.069	5.125	.000	.996	1.004
3	(Constant)	585.999	4.747		123.437	.000		
	TitleINonIV	1.513	1.530	.014	.989	.323	.833	1.201
	NonTitleINonIV	4.335	1.799	.036	2.410	.016	.745	1.341
	days present in school - kindergar	.099	.026	.048	3.732	.000	.984	1.016
	FEMALE	-2.464	1.227	-.026	-2.009	.045	.999	1.001
	AFAM	-32.135	1.764	-.282	-18.212	.000	.683	1.464
	HISP	-21.987	1.929	-.216	-11.400	.000	.454	2.201
	ASAM	6.166	2.138	.043	2.885	.004	.735	1.361
	AMIND	-31.617	12.415	-.033	-2.547	.011	.990	1.010
	English Language Learner	-14.267	1.650	-.136	-8.644	.000	.658	1.520

a. Dependent Variable: CTBS_math_ss (grade 2)

Appendix J

Multiple Comparisons

Dependent Variable		(I) School grouped in three cohort	(J) School grouped in three cohort	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
MSA_Gr5_Read_ss (grade 5 scale score)	Tukey HSD	Title I Intervention	Title I Non-intervention	-14.385*	1.715	.000	-18.41	-10.36
			Non-title I non-intervention	-27.489*	1.943	.000	-32.05	-22.93
		Title I Non-intervention	Title I Intervention	14.385*	1.715	.000	10.36	18.41
			Non-title I non-intervention	-13.104*	2.160	.000	-18.17	-8.04
		Non-title I non-intervention	Title I Intervention	27.489*	1.943	.000	22.93	32.05
			Title I Non-intervention	13.104*	2.160	.000	8.04	18.17
	Scheffe	Title I Intervention	Title I Non-intervention	-14.385*	1.715	.000	-18.59	-10.18
			Non-title I non-intervention	-27.489*	1.943	.000	-32.25	-22.73
		Title I Non-intervention	Title I Intervention	14.385*	1.715	.000	10.18	18.59
			Non-title I non-intervention	-13.104*	2.160	.000	-18.39	-7.81
		Non-title I non-intervention	Title I Intervention	27.489*	1.943	.000	22.73	32.25
			Title I Non-intervention	13.104*	2.160	.000	7.81	18.39
	Dunnett T3	Title I Intervention	Title I Non-intervention	-14.385*	1.790	.000	-18.66	-10.11
			Non-title I non-intervention	-27.489*	1.917	.000	-32.08	-22.90
		Title I Non-intervention	Title I Intervention	14.385*	1.790	.000	10.11	18.66
			Non-title I non-intervention	-13.104*	2.244	.000	-18.47	-7.74
		Non-title I non-intervention	Title I Intervention	27.489*	1.917	.000	22.90	32.08
			Title I Non-intervention	13.104*	2.244	.000	7.74	18.47
MSA_Gr5_Math_ss (grade 5 scale score)	Tukey HSD	Title I Intervention	Title I Non-intervention	-13.446*	2.107	.000	-18.39	-8.50
			Non-title I non-intervention	-32.972*	2.388	.000	-38.57	-27.37
		Title I Non-intervention	Title I Intervention	13.446*	2.107	.000	8.50	18.39
			Non-title I non-intervention	-19.526*	2.653	.000	-25.75	-13.30
		Non-title I non-intervention	Title I Intervention	32.972*	2.388	.000	27.37	38.57
			Title I Non-intervention	19.526*	2.653	.000	13.30	25.75
	Scheffe	Title I Intervention	Title I Non-intervention	-13.446*	2.107	.000	-18.61	-8.28
			Non-title I non-intervention	-32.972*	2.388	.000	-38.82	-27.12
		Title I Non-intervention	Title I Intervention	13.446*	2.107	.000	8.28	18.61
			Non-title I non-intervention	-19.526*	2.653	.000	-26.03	-13.03
		Non-title I non-intervention	Title I Intervention	32.972*	2.388	.000	27.12	38.82
			Title I Non-intervention	19.526*	2.653	.000	13.03	26.03
	Dunnett T3	Title I Intervention	Title I Non-intervention	-13.446*	2.202	.000	-18.71	-8.18
			Non-title I non-intervention	-32.972*	2.239	.000	-38.33	-27.61
		Title I Non-intervention	Title I Intervention	13.446*	2.202	.000	8.18	18.71
			Non-title I non-intervention	-19.526*	2.615	.000	-25.78	-13.27
		Non-title I non-intervention	Title I Intervention	32.972*	2.239	.000	27.61	38.33
			Title I Non-intervention	19.526*	2.615	.000	13.27	25.78

*. The mean difference is significant at the .05 level.

Appendix K

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	405.409	.695		582.958	.000		
	TitleINonIV	13.917	1.211	.177	11.490	.000	.913	1.095
	NonTitleINonIV	23.141	1.353	.264	17.106	.000	.913	1.095
2	(Constant)	97.384	6.001		16.227	.000		
	TitleINonIV	6.566	.962	.084	6.828	.000	.893	1.120
	NonTitleINonIV	8.200	1.101	.093	7.447	.000	.850	1.177
	CTBS_read_ss (grade 2	.507	.010	.620	51.540	.000	.926	1.080
3	(Constant)	78.365	10.205		7.679	.000		
	TitleINonIV	6.684	.954	.085	7.004	.000	.890	1.123
	NonTitleINonIV	8.210	1.093	.094	7.514	.000	.847	1.180
	CTBS_read_ss (grade 2	.478	.010	.584	46.003	.000	.817	1.224
	days present in school grade 5	.221	.048	.053	4.631	.000	.988	1.012
	special education grade	-8.731	1.177	-.091	-7.419	.000	.879	1.138
4	(Constant)	113.193	10.324		10.964	.000		
	TitleINonIV	3.798	.974	.048	3.898	.000	.817	1.224
	NonTitleINonIV	2.493	1.164	.028	2.141	.032	.714	1.401
	CTBS_read_ss (grade 2	.434	.011	.530	40.565	.000	.737	1.357
	days present in school grade 5	.221	.047	.053	4.695	.000	.974	1.026
	special education grade	-8.751	1.160	-.091	-7.544	.000	.865	1.156
	FEMALE	2.585	.789	.037	3.278	.001	.974	1.026
	AFAM	-12.610	1.168	-.151	-10.792	.000	.645	1.550
	HISP	-10.316	1.252	-.140	-8.240	.000	.438	2.285
	ASAM	.799	1.331	.008	.601	.548	.721	1.387
	AMIND	.992	8.098	.001	.122	.903	.988	1.012
	English Language Learner	-3.115	1.056	-.041	-2.949	.003	.648	1.543

a. Dependent Variable: MSA_Gr5_Read_ss (grade 5 scale score)

Appendix L

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	417.707	.815		512.789	.000		
	TitleINonIV	10.077	1.418	.111	7.104	.000	.913	1.096
	NonTitleINonIV	23.960	1.582	.236	15.142	.000	.913	1.096
2	(Constant)	88.954	5.344		16.646	.000		
	TitleINonIV	3.600	1.035	.040	3.480	.001	.903	1.107
	NonTitleINonIV	9.798	1.171	.097	8.368	.000	.878	1.139
	CTBS_math_ss (grade	.569	.009	.684	61.900	.000	.960	1.042
3	(Constant)	41.092	10.155		4.047	.000		
	TitleINonIV	3.514	1.013	.039	3.468	.001	.902	1.109
	NonTitleINonIV	9.334	1.147	.092	8.139	.000	.876	1.142
	CTBS_math_ss (grade	.530	.010	.637	55.739	.000	.859	1.164
	days present in school grade 5	.419	.051	.087	8.210	.000	.987	1.014
	special education grad	-13.529	1.247	-.122	-10.853	.000	.894	1.119
4	(Constant)	73.080	10.207		7.160	.000		
	TitleINonIV	.976	1.033	.011	.944	.345	.819	1.220
	NonTitleINonIV	3.563	1.229	.035	2.899	.004	.721	1.387
	CTBS_math_ss (grade	.488	.010	.587	49.894	.000	.765	1.307
	days present in school grade 5	.416	.050	.087	8.311	.000	.973	1.028
	special education grad	-13.467	1.228	-.121	-10.968	.000	.871	1.149
	FEMALE	2.852	.837	.036	3.407	.001	.975	1.026
	AFAM	-16.125	1.251	-.167	-12.885	.000	.634	1.577
	HISP	-11.502	1.322	-.135	-8.702	.000	.442	2.261
	ASAM	2.462	1.411	.021	1.744	.081	.726	1.378
	AMIND	-4.687	8.588	-.006	-.546	.585	.989	1.011
	English Language Learner	.914	1.122	.010	.814	.416	.649	1.542

a. Dependent Variable: MSA_Gr5_Math_ss (grade 5 scale score)

Appendix M

September 2002

KINDERGARTEN MATHEMATICS

The goal of the County Public Schools pre-K-12 mathematics program is for all students to achieve mathematical proficiency through mastery of mathematical skills, concepts, and processes. The end result is the ability to think and reason mathematically and use mathematics to solve problems in authentic contexts.

The mathematics curriculum at each grade level is organized into units of instruction. The following statements provide an overview of what students should know and be able to do by the end of each unit in kindergarten. Throughout all units, students will apply concepts and skills to solve problems, communicate and reason mathematically, and make mathematical connections.

Unit 1: Patterns and Classification

- Describe the location of an object using directional and position words.
- Identify, describe, extend, and create patterns using concrete objects.
- Organize and display data using bar graphs and pictographs as a class.
- Sort objects and explain the sorting rule.

Unit 2: Exploring Numbers

- Count through and beyond 10 to identify the number of objects in a set.
- Identify and create sets of objects with more, less, or equal amounts.
- Recognize odd and even numbers of objects.
- Identify the position of an object using the numbers first through fifth.

Unit 3: Measurement and Geometry

- Identify and describe measurable attributes such as length and weight.
- Measure length using direct comparison and non-standard units.
- Recognize and describe basic two- and three-dimensional shapes including circle, triangle, rectangle, pyramid, cube, and cylinder.
- Sequence events.

Unit 4: Combining and Separating

- Recognize, write, and use whole numbers through 10 in meaningful contexts.
- Count forward to 31 and backward from 10.
- Estimate quantities less than 20.
- Model addition and subtraction using concrete objects.
- Solve story problems using a variety of strategies.
- Name and identify the value of a penny, a nickel, and a dime.

Appendix N

September 2002

KINDERGARTEN READINGILANGUAGE ARTS

The County Public Schools elementary reading/language arts program includes reading, writing, listening, and speaking. The goal of the program is to help all students communicate effectively orally and in writing and use language proficiently for a variety of purposes. The reading program provides instruction in reading and word study (including phonics) and builds the skills needed to be an independent reader. The elementary language arts program consists of writing instruction, which includes the teaching of the writing process, the craft of writing, the conventions of language (including spelling and grammar), and independent writing. This comprehensive program of reading, writing, listening, and speaking is known as balanced literacy. The kindergarten curriculum focuses on the foundational skills necessary for early reading and writing success.

Reading

Foundational Skills for Reading:

Concepts About Print

- Follows words left to right, top to bottom, return sweep
- Identifies parts of a book
- One-to-one matching of spoken words to printed words

Phonemic Awareness

- Identifies words beginning with the same sounds
- Blends sounds together to make words
- Identifies and makes rhyming words

Alphabetic Principles/Phonics

- Recognizes and identifies all upper and lower case letters
- Matches consonant sounds to appropriate letters
- Matches spoken words to written words
- Begins to use initial consonant sounds to read words
- Begins to use word patterns to read words (_at, _all)

Oral Language Development

- Retells important details in a story
- Speaks to inform or relates experiences
- Expands word choices to communicate effectively

Word Recognition

- Reads simple high frequency words
- Recognizes environmental print (e.g., stop sign, up and down arrows)

Comprehension Processes

- Reads beginning level text

Writing

- Contributes to a group writing experience
- Expresses a thought using drawings, letters, or words
- Makes a list to plan ideas
- Writes simple sentences
- Spells high frequency words correctly
- Writes independently using approximated spelling

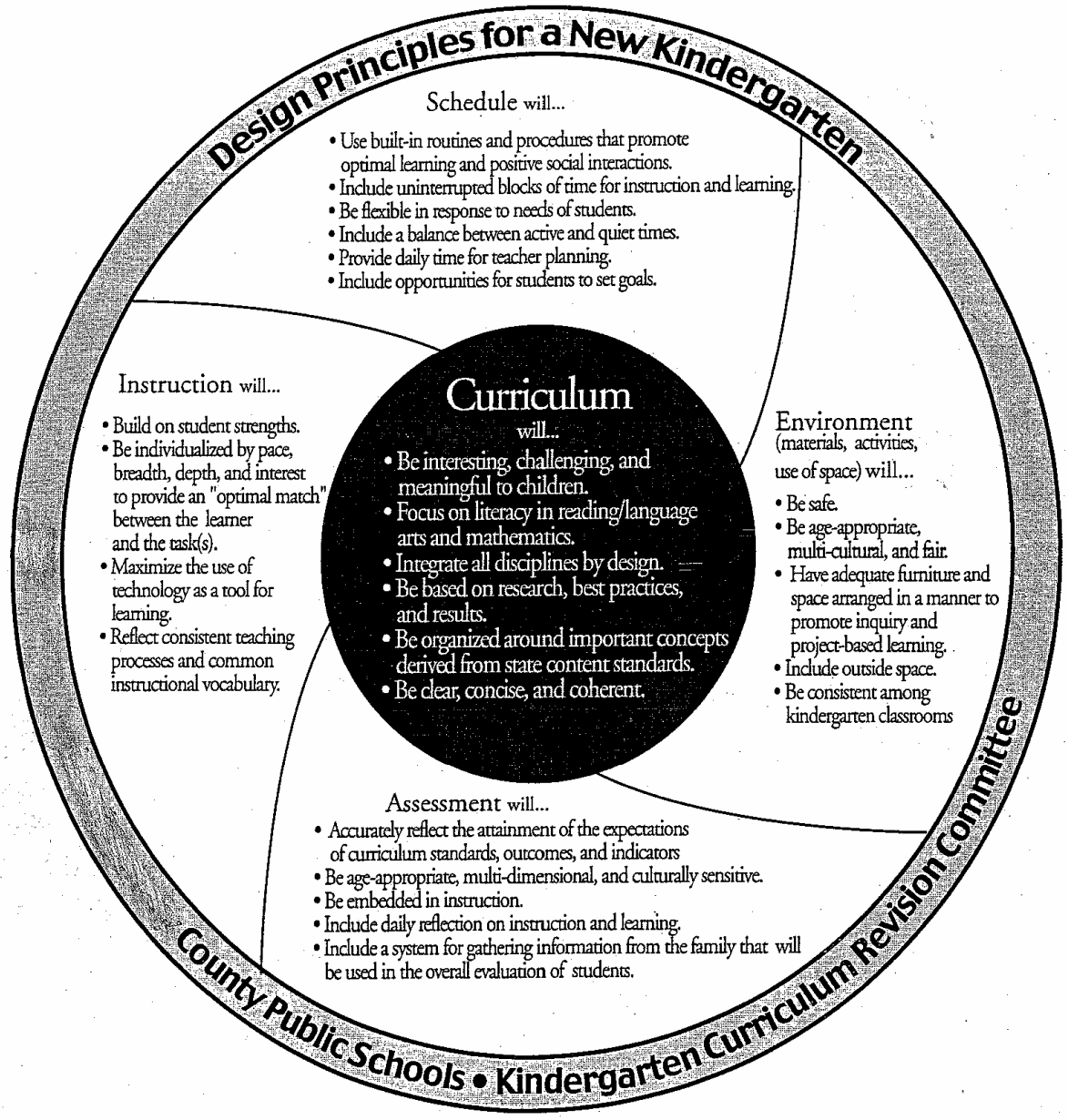
September 2002

Listening and speaking skills strategies are learned and applied during reading and writing instruction.

- Repeats information heard from stories and spoken presentations
- Uses social conventions when appropriate (please, thank-you, excuse me)

For more detailed information regarding what text is appropriate for each grade level, see the MCPS Curriculum Framework for English/Language Arts available in school media centers or at http://mcps.k12.md.us/info/curriculum/docs/framework/ELABookleveling.pdf.

Appendix O
Curriculum Framework



(1999 December). *Redesign of kindergarten program.* Memorandum to members of the Board of Education.

The revised **rigorous and accelerated curriculum** will contain **a written framework and schedule that allocates whole blocks of time** for sustained, high quality teaching… Features will include:

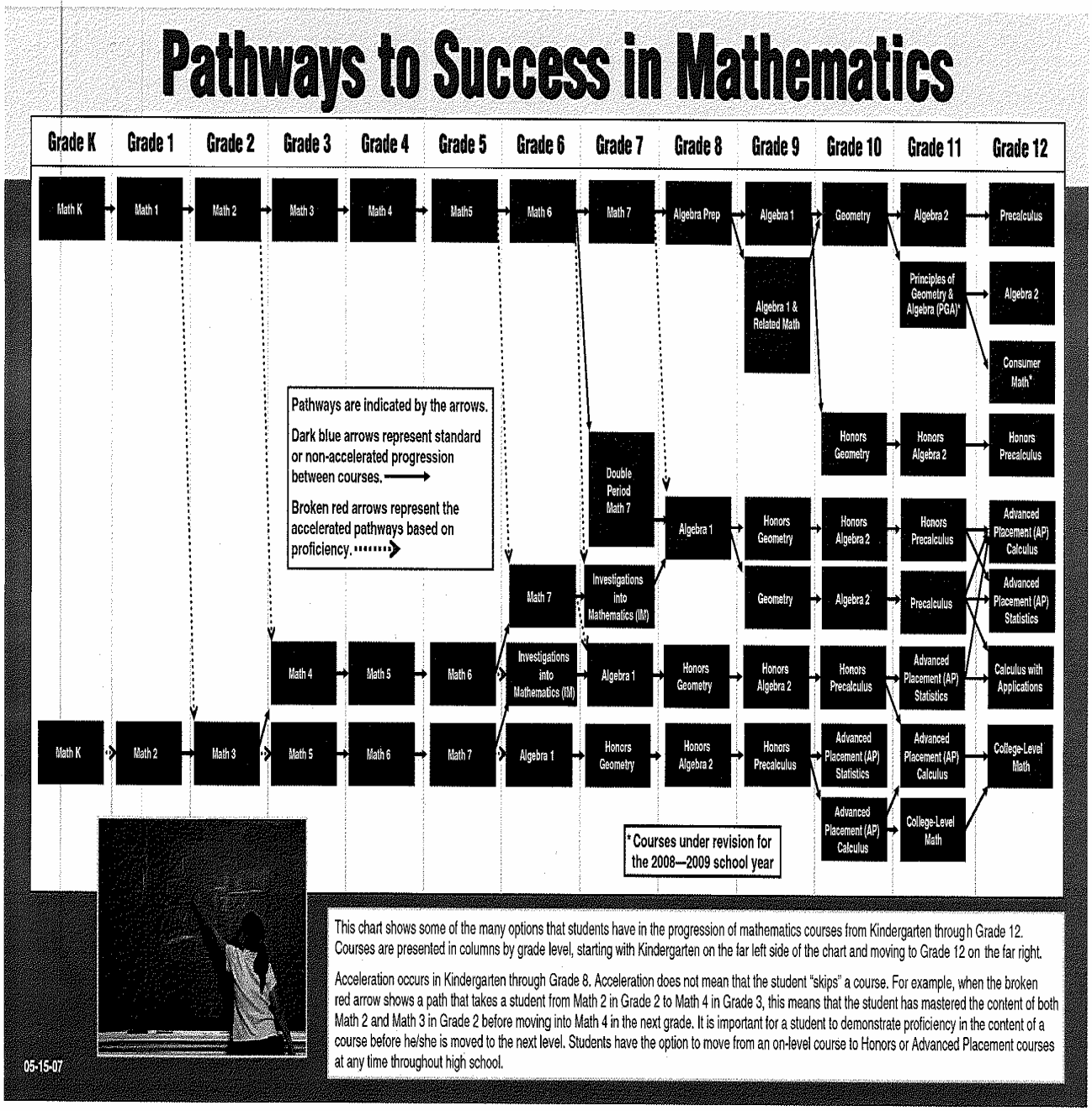
- **Challenging and accelerated instruction in a literacy-based curriculum**
- **content standards in reading, mathematics, science, and social studies**
- **Instruction that mirrors the Reading Initiative approach** to develop emerging reading fluency and comprehension skills of students
- **Essential questions to guide children during their exploration** of topics and themes
- **Mathematics manipulatives, experiments in science, and technologies that promote real-world problem solving**
- **Provision for students to progress through the curriculum at an accelerated pace**
- Specified content outcomes, performance outcomes as measured by a **revised assessment component**, and **an inventory of furnishings, print, and instructional materials**

Instruction delivery will offer:

- **Extended time allocations for reading, writing, and mathematics**
- **Use of flexible groupings and regrouping strategies**
- **Cooperative learning opportunities**
- **Literacy-based instructional activities that integrate the curriculum disciplines, promote higher order thinking, and respond to individual needs**
- **On-going parent-teacher communication**
- **Early identification and intervention**
- **Strategies to accelerate learning, mastery, and achievement**

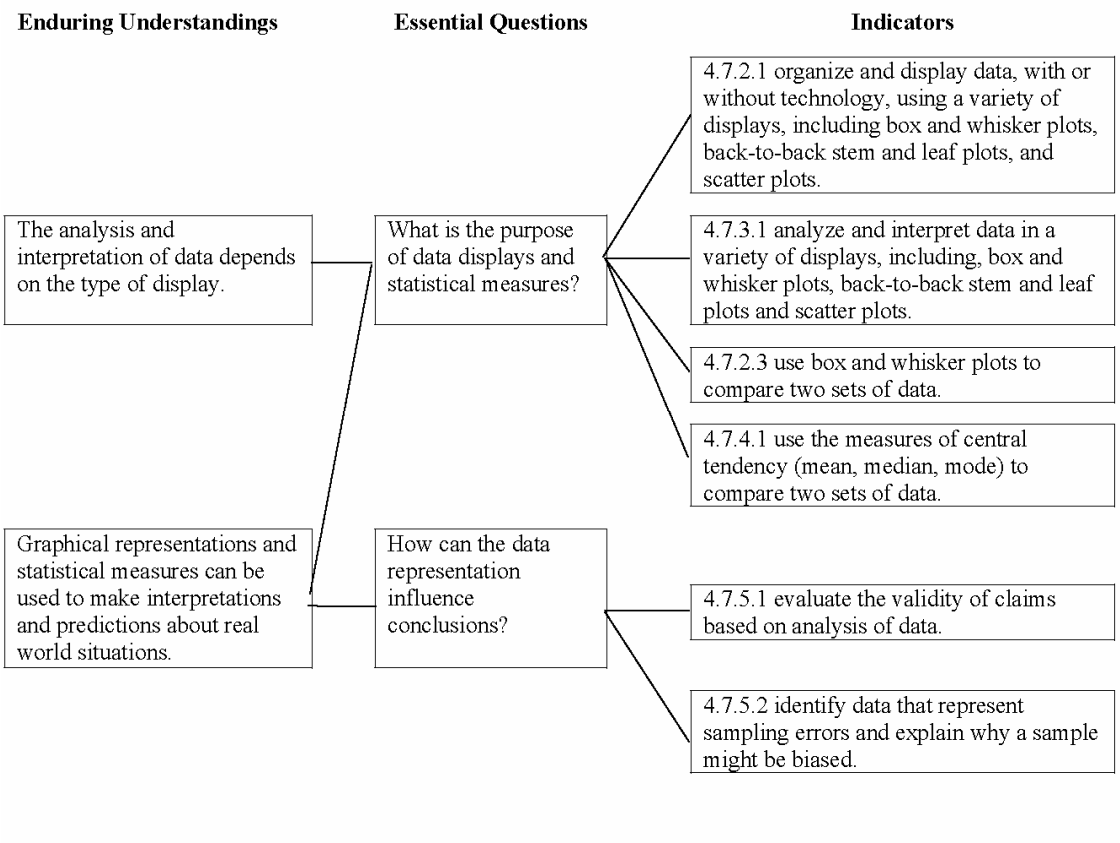
Comprehensive assessments of student performance will be designed to include:

- **Early childhood academic assessments in reading, writing, and mathematics that utilize pre- and post-test student performance measures**
- **Utilization of existing measures including systematic observation by teachers, the *Early Childhood Observation Record*, running records, and portfolio of children's work**
- **Development of a system to monitor the progress of students identified as needing interventions or referrals**
- **Documentation through assessments of students' acquired knowledge and skill**


Pathways to Success in Mathematics
Grade K
Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Grade 6
Grade 7
Grade 8
Grade 9
Grade 10
Grade 11
Grade 12
Math K
Math 1
Math 2
Math 3
Math 4
Math5
Math 6
Math 7
Algebra Prep
Algebra 1
Geometry
Algebra 2
Precalculus
Algebra 1 & Related Math
Principles of Geometry & Algebra (PGA)*
Algebra 2
Consumer Math*
Pathways are indicated by the arrows.
Dark blue arrows represent standard or non-accelerated progression between courses.
Broken red arrows represent the accelerated pathways based on proficiency.
Honors Geometry
Honors Algebra 2
Honors Precalculus
Double Period Math 7
Algebra 1
Honors Geometry
Honors Algebra 2
Honors Precalculus
Advanced Placement (AP) Calculus
Math 7
Investigations into Mathematics (IM)
Geometry
Algebra 2
Precalculus
Advanced Placement (AP) Statistics
Math 4
Math 5
Math 6
Investigations into Mathematics (IM)
Algebra 1
Honors Geometry
Honors Algebra 2
Honors Precalculus
Advanced Placement (AP) Statistics
Calculus with Applications
Math K
Math 2
Math 3
Math 5
Math 6
Math 7
Algebra 1
Honors Geometry
Honors Algebra 2
Honors Precalculus
Advanced Placement (AP) Statistics
Advanced Placement (AP) Calculus
College-Level Math
Advanced Placement (AP) Calculus
College-Level Math
*Courses under revision for the 2008—2009 school year
This chart shows some of the many options that students have in the progression of mathematics courses from Kindergarten through Grade 12. Courses are presented in columns by grade level, starting with Kindergarten on the far left side of the chart and moving to Grade 12 on the far right.
Acceleration occurs in Kindergarten through Grade 8. Acceleration does not mean that the student "skips" a course. For example, when the broken red arrow shows a path that takes a student from Math 2 in Grade 2 to Math 4 in Grade 3, this means that the student has mastered the content of both Math 2 and Math 3 in Grade 2 before moving into Math 4 in the next grade. It is important for a student to demonstrate proficiency in the content of a course before he/she is moved to the next level. Students have the option to move from an on-level course to Honors or Advanced Placement courses at any time throughout high school.
05-15-07

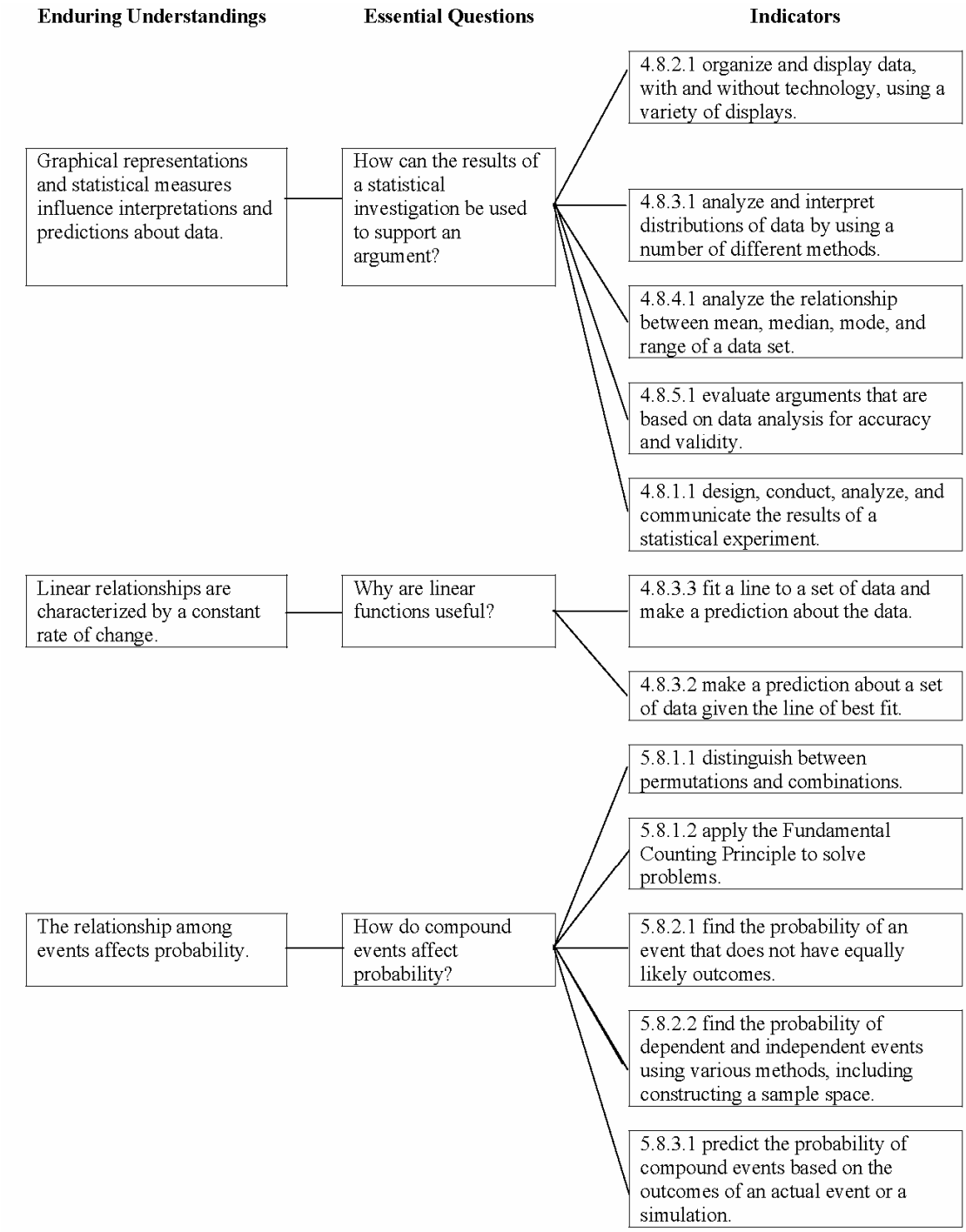
Appendix Q
Math B Regular Content Map

MATH B **Introduction**
Unit 1 **Content Map**



Math B Accelerated Content Map

MATH B **Acceleration**
Unit 1 **Content Map**



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