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The Influence of Exposure to Inclusive School Environments on the Mathematical Achievement of General Education Elementary School Students

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THE INFLUENCE OF EXPOSURE TO INCLUSIVE SCHOOL ENVIRONMENTS ON
THE MATHEMATICAL ACHIEVEMENT OF
GENERAL EDUCATION ELEMENTARY SCHOOL STUDENTS

ANDREW P. DAVIS

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Submitted in partial fulfillment of the
requirements for the degree of
Doctor of Education

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2015
APPROVAL FOR SUCCESSFUL DEFENSE

Doctoral Candidate, Andrew Patrick Davis, has successfully defended and made the required modifications to the text of the doctoral dissertation for the Ed.D. during this Spring Semester 2015.

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The mentor and any other committee members who wish to review revisions will sign and date this document only when revisions have been completed. Please return this form to the Office of Graduate Studies, where it will be placed in the candidate’s file and submit a copy with your final dissertation to be bound as page number two.
The Influence of Exposure to Inclusive School Environments on the Mathematical Achievement of General Education Elementary School Students

ABSTRACT

This study examined the influence of student exposure levels as measured by time (years and total minutes per day) on the academic achievement of general education students taught in inclusive classrooms. An ancillary examination was conducted to ascertain the impact of co-teaching classroom instruction on general education students’ math achievement. A non-experimental, cor relational, cross-sectional, explanatory design with quantitative measures was executed. The North West Education Association’s Measure of Academic Progress mathematics scores were used to compare the achievement of students in Grade 6 as compared to Grade 3 baselines. Five simultaneous regression analyses were conducted leading to the identification of the model of best fit.

The results of this one district case study indicated that exposure to inclusive classroom environments did not have a significant impact on the mathematics achievement of general education students. The archival student data were taken from one large (10 homerooms per grade level) upper-elementary (Grades 4 through 6) building in southern New Jersey. The final regression analysis, the model of best fit, was found to be statistically significant ($p = .000 < .05$) and had no multicollinearity. The included variables (one year of exposure, three years of exposure, co-teaching environment, Grade 3 MAP results, and socioeconomic status) predicted 48% of the variance in the spring MAP RIT scores in Grade 6. The Grade 3 MAP assessment data was the only variable to be a statistically significant predictor of future math performance in all models.
The findings of this study suggest that further research is needed in order to determine the relationship between inclusive classroom environments and student achievement. The data from this study found neither a positive nor a negative impact on general education students’ math performance and may be used to answer parental concerns in regard to inclusive classroom environments (e.g., decreased rigor, increased distractions). The data also do not support the argument in regard to lower class size and/or increased student-teacher contact time; there was no impact. In order for education leaders and policy makers to make informed policy and/or practice decisions, they must consider the varied research findings while also considering their school and student needs.
ACKNOWLEDGMENTS

Anyone that has ever taken on a huge endeavor realizes that the task in and of itself is not the only hurdle. Upon the start of my dissertation, Dr. Charles “Chuck” Achilles shared that this was one of the most selfish tests that anyone could undertake. This of course is very true. That being said, this selfish test is one that I could have not done alone.

I would first and foremost like to thank my wife Kristin and children, Lilly, Ella, Luke, and Gabe, for bearing with me. This test was quite a challenge and through it all, you loved and supported me unconditionally. When I wrote the first draft, there were only three Davis family members and now there are six! To my mother, Bernice, I thank you for the weekly chides, “Are you done with that thing yet?” It is nearly finished . . .

“Finished, it’s finished, nearly finished, it must be nearly finished. (Pause) Grain upon grain, one by one, and one day, suddenly, there’s a heap, a little heap, the impossible heap,” CLOV from *End Game: A Play in One Act* by Samuel Beckett.

To my Harrison Township family, I thank you as well. From two supportive superintendents, Dr. Hoey and Dr. Peretti; a highly motivating interim-superintendent, Dr. Wasilewksi; the administrative team Joan Ruberton, Scott Heino, Patricia Haney, Robert Scharle, Mariann Edelmayer, Deborah Calabree, Lisa Heenan, and Renee Ingiosi; the administrative secretaries Pat Acton, Cathy Porter, Barbara Gibbs and the one and only Valarie Eastlack; the teachers; the custodial crew – Doc and Oz; our “tech guy” Shawn Shenk; and the Board of Education, I thank you all.

To my fellow Cohort XI members – Veni Vidi Vici!
To my mentor, Dr. Tienken, I thank you. Chris expressed an interest in my research at our first informal meeting at the bar. His natural curiosity and zest for knowledge and understanding is contagious. “What does the data say?” Dr. Tienken willingly took me on at the request of Dr. Achilles and for that I will be forever grateful. Several Cohort XI members assured me that, with Chris by my side, I would successfully defend and complete my doctorate. Chris let me struggle and set my own timelines too. It was not until that fateful phone conference with Dr. Colella for the hourglass to be turned.

Dr. Colella knew exactly how to motivate me. There are a few dates etched in my memory. One is the day I fractured my tibia and fibula pole vaulting – February 22, 1988; this event impacted my academic and overall life path(s). Another significant date in my life was February 2, 2015. This is the day I spoke to my second reader for the first time. After a thorough review of my research proposal, Dr. Colella stated, “I know your history. I have read your work. I have a dissertation defense on April 23, 2015, at 2:00 p.m.. You need to look at your calendar and work backwards so that you can defend at 3:30.” From this date forward my research work has been driven, focused, and swift (and supported fully through the efforts of Dr. Tienken). Dr. Colella, thank you for the ridiculous timeline.

To Dr. Axtell, thank you for joining my dissertation team. I was fortunate to meet Dr. Axtell after my short vault. Exposure to the physiology laboratory at Southern Connecticut State University allowed me to push myself physically and mentally. I can still picture Dr. Axtell peering into the classroom as I taught my first graduate class. I can
also hear him providing guidance in a dim lab as Dr. Axtell, a fellow lab assistant, and I waited to run a Max V02 test in the early morning. Who would have thought I would enjoy and appreciate academia? Dr. Axtell helped to focus a confused young man through clear rigorous expectations and a kind heart. He also helped to focus a man. Dr. Axtell said, “When the dissertation becomes a priority, you will get it done.”

Dr. Bob, thank you for pitching in. Who would have guessed that you and I would have turned out to be lifelong friends? From the transition from Erlton to Clara Barton in Grade 5, where a skinny kid protected another skinny kid from the taunting of others, to road trips in vans and jeeps from coast to coast, we have been friends. When I was surprised to have completed my masters, Dr. Donley was not. When I went to USC to work on a Ph.D., he found it fitting. Dr. Donley’s outlook on life and open-mindedness towards others is uplifting. With your support, Dr. Donley, I did “get’r done.”

In closing, I would like to thank and acknowledge my original mentor, Chuck Achilles, for his patience and support throughout this process. His knowledge as well as his firm yet flexible hand allowed me to fully experience the dissertation process at a deep and almost spiritual level. His wife Karen joined in as my second mother, gently cajoling me along. As is echoed by fellow members of Cohort XI, Chuck was one-of-a-kind. Dr. Achilles’ legacy will be carried on through his teachings and personal impact on each and every one of us. Class size and heterogeneous grouping matter and I do not plan on wrestling a chimpanzee. Cheers!
DEDICATION

I dedicate this accomplishment in the loving memory of my father, William John Davis, Jr. Without his high-expectations, drive, and support, I would never have contemplated taking on a journey such as this.

I miss you “Big Guy.”

“Number Two Son.”
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CHAPTER I
INTRODUCTION

Introduction

From the inception of the one-room schoolhouse to the public and private school education options of today, the aspiration to meet and exceed the needs of America’s diverse population of learners has impacted some education administrator’s decision making. Teaching practices based on philosophical beliefs and hunches, although sometimes substantiated by research, theory, practical experience, and actual student outcomes, sometimes fall short when scrutinized (Shavelson & Towne, 2002). Education administrators must base their policy decisions and practices on data and established research findings (Achilles, 1994).

Public education implementation in America is a state function. Even under the premise that education is for all residents, America’s public school systems originally provided formal instruction only to the affluent. Over time, the leaders of our nation as well as its citizenry realized that an educated populace equated to a productive workforce; in a letter to Colonel Charles Yancey on January 6, 1816, Thomas Jefferson stated, “If a nation expects to be ignorant and free in a state of civilization, it expects what never was and never will be.” While America moved from an agriculturally-based economy to an industrialized economy, the curricula in the public school needed to change. The industry-based economy called for a different skill set. These skills continue to change as Americans adapt to the revolution in technology.

Currently educators attempt to meet the needs of a diverse population and to teach all our youth, yet there is no curricular model that meets all students’ needs (George,
Curriculum standards continue to be raised and redefined while questions revolving around the benefits of inclusive models for students with special needs and the academic and social-emotional impact upon general and special education students are challenged. Student performance on standardized assessments has become the primary indicator of success for students, teachers, administrators, and school systems (Ward, Montague, & Linton, 2003). Researchers have questioned the impact of inclusive environments on general education students; does accommodating the needs of the few put the learning opportunities of the many at risk (York & Tundidor, 1995)? What is the best way to meet the needs of all our communities, families, and students?

**Background**

Historically, the majority of students with special needs were educated in a segregated special education setting. Many special education students were not permitted to attend their neighborhood school and/or were not provided the support services needed to ensure their school and future success (Landolf, 2004). Parental pressures placed on the courts and legislators questioned whether the civil rights of these students were violated, initiated investigations into educational programs, and prompted educational change toward greater inclusivity. Early backing for educational change related to inclusive classroom environments was suggested in the Coleman report of 1966 and questioned further by Dunn (1968).

Inclusionary education practices reinforce the philosophical position that every child is entitled to an instructional program that will meet his or her individual needs and learning characteristics in the general education classroom, (The Council for Disability Rights, 2013). “To the maximum extent appropriate, children with disabilities, including
children in public or private institutions and other care facilities, are educated with children who are not disabled” (IDEA, 20 U.S.C. § 1412 [a][5]). In an inclusionary setting, support services are brought to the student rather than moving the student to the services (Mastropieri & Scruggs, 2000).

The 1954 case of Brown v. Board of Education supported the inclusion of African American students in public schools and clearly established that “separate but equal is inherently unequal” and paved the way for students with special needs. The Education for All Handicapped Children Act (EAHCA) of 1975 (PL 94-142) mandated public school administrators that accepted federal funds to provide a free and appropriate education (FAPE) in the least restrictive environment (LRE) to all students. The EAHCA was reauthorized in 1997 and 2004 and found its strength in the Equal Protection Clause of the Fourteenth Amendment to the U.S. Constitution. Additional case law supported and strengthened inclusionary practices. One such case includes Oberti v. BOE of the Borough of Clementon School District (3rd Circuit Court, 1993). In the Oberti decision, the court ruled in favor of more inclusive settings than that provided by a self-contained classroom environment. The National Study of Inclusive Education (1994) reported, “Students with severe disabilities must be included in their local school with their non-disabled peers and in some instances with appropriate aids and support” (p. 10).

Moreover, the No Child Left Behind Act of 2001 (NCLB) (PL 107-110) passed in January 8, 2002, supported inclusionary practices.

A three-part inquiry to determine whether students with special needs should be educated in a general education classroom was presented by DeMitchell and Kerns (1997) after a review of pertinent court cases. The first question to answer was whether
the identified child received an educational benefit (academic and/or nonacademic) from a general education placement. The second question addressed the gestalt of the learning environment. What was the child’s overall educational experience in the mainstream or general education environment when considering the benefits of general and special education instruction? Another question addressed the influence of the presence of the special education student on the general education students and the teaching environment. The third LRE question drives the current one district case study and includes the influence of the special education and identified basic skills students as well as the support staff for these students.

Kerzner-Lipsky and Gartner (1998) suggested only the most “normal” were considered for placement in the general education classroom. Mainstreaming does not equal inclusion as in the case of earlier segregation findings (Freagon, 1993). Mainstreaming is the selective process of placing a special education student into one or more general education classes without modifications in the curriculum (Rogers, 1993). The mainstreamed student must keep up with the general education curriculum. “Inclusion does not mean trying to fit students with special needs into the mainstream: instead it means creating a mainstream where everyone fits” (Snell & Janney, 1993, p. 245). Therefore “mainstream” implies a privilege for the special education student; and inclusion is a right (Brewton, 2005, p. 3). Former Assistant Secretary of Education Madeline Will’s 1986 plan, commonly referred to as the Regular Education Initiative (REI), was a catalyst for integrated education, or rather for inclusion. Will’s plan to establish “partnerships” between special education and general education programs achieved national recognition under President Reagan’s administration. “Although well
intended, the so-called ‘pull-out’ approach to the educational difficulties of students with learning problems has failed in many instances to meet the educational needs of these students” (Will, 1986, p. 413).

**Inclusion**

The practice of inclusion is controversial (Cronis & Ellis, 2000; Florian, Rouse, Black-Hawkins, & Jull, 2004; York & Tundidor, 1995). Discussions typically generate confusion and apprehension in all parties. Proponents of inclusion report that inclusionary practices reduce social stigmas, increase peer interactions, and attain higher achievement levels than their non-included peers (Peltier, 1997; Salend & Duhaney, 1999). A review of research by Staub & Peck (1994) noted that although the research is limited, their findings do not support a negative impact on the academic outcomes of non-identified students in inclusionary classrooms and do support strong positive impacts on the social-emotional growth for all students; they found the research consistent. Special education students have more appropriate social behavior and improved social competence coupled with their higher levels of academic achievement in inclusionary settings (Fryxell & Kennedy, 1995; Rea, McLaughlin, & Thomas, 2002; Sharpe, York & Knight, 1994; Walther-Thomas, Bryant & Land, 1996).

Proponents of inclusion state the American public school system should support our democratic ideals; inclusionary school practices are not only justified but should be standard practice (Brewton, 2005; Will, 1986). Kochar, West, and Taymans (2000) suggested that adequate education services for all students with special needs can and should be provided within the general education classroom and that students can obtain both social and emotional benefits from inclusionary practices.
Opponents of inclusionary practices stated that special education students are not successful socially or academically when placed in inclusionary environments (Daniel & King, 1997). They further questioned the appropriate use of funds and resources; traditional classrooms are inadequate to meet the needs of students with special needs and adversely affect the entire classroom. The increased financial cost and commitment inversely influences the general education students (Greenwald, Hedges, & Laine, 1996).

The principles set forth in the general (regular) education initiative (REI) and the inclusive schooling movements have gained momentum and are becoming the standards used to restructure special education delivery (National Association of School Boards of Education or NASBE, 1992). As students’ needs diversify, education administrators will need to search for effective ways in which to meet the needs of a diverse student body (e.g., structures, financial resources, staffing, curriculum resources, and curriculum delivery). The increasing diversity of students will require greater understanding of students, deeper knowledge of curriculum resources, and a more diverse pedagogy than ever before.

The research on the effects of inclusion on general education students is not as extensive. Much of the research supports the affective gains for general education students and includes variables such as empathy and increased self-esteem (Logan, Diaz, Piperno, Rankin, MacFarland, & Garamain, 1994-1995; Peltier, 1997). There are mixed outcomes on the academic impact of inclusion on general education students (Fletcher, 2010; Staub & Peck, 1995). Based on the limited empirical research on the influence of inclusive school environments on the impact of the academic achievement of elementary students, further investigation is warranted.
Statement of the Problem

Even under the purist egalitarian tenets, all things do not necessarily have to be equal to be just. Berkman (2003) stated, “Equality doesn’t mean an equal amount but equal opportunity . . .” (p. 164). With such overarching democratic philosophies as a foundation, school administrators are responsible for ensuring that the use of public resources benefits the entire student population in their school districts.

Many instructional delivery models have been used in schools, including an assortment of pull-in and push-out support from teachers and/or paraprofessionals for general education (basic skills) and special education students (Carroll, 1963). Additionally, the negative influence of general education push-in basic skills and special education co-teaching has not been supported in the literature in regard to student-teacher contact time (McDonnell, Thorsen, Disher, Mathot-Buckner, Mendel, & Ray, 2003). School administrators who created push-in and/or co-teaching delivery models have asserted that, in classrooms with special-needs students, all students benefit from these supports. There is continuing need for correlational, explanatory, quantitative research to support these claims. The overarching question that has compelled the present study is as follows: What is the influence of the amount of exposure to inclusive environments over multi-year periods on the mathematics achievement of general education students when controlling for student variables?

Purpose for the Study

The purpose for this one-district case study was to explain the influence of student exposure to inclusive school environments (in-class support (general education basic skills instruction) and co-teaching (special education)) on the mathematics achievement
of general education elementary students as measured by adaptive achievement tests (NWEA MAP mathematics) over multi-year periods. Computerized adaptive testing begins with a large bank of questions; as a student progresses, the computer selects questions based on the test taker’s success or lack of success (Kingsbury, Freeman, & Nesterak, 2014). The results of this study may offer education administrators and policy makers with data to create in-class support policy, efficiently use resources (staffing), and alter the configurations of schools in order to increase student achievement.

Research Questions

Utilizing data obtained with approval from the district board of education and superintendent of schools, the researcher ran multiple regressions in order to determine the influence (strength and direction) between exposure (years and total minutes per day) to inclusive classroom environments and student performance on the NWEA MAP assessment in mathematics. The study was guided by the following central research question: To what extent does exposure to inclusive classroom environments over multi-year periods influence the mathematics achievement of general education students when controlling for student variables?

Research Question 1: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (years) to inclusionary classes over a three-year period?

Research Question 2: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (total minutes per day) to inclusionary classes over a three-year period?
Research Question 3: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and exposure to co-teaching (special education) environments within a three-year period?

Variables

The study included exposure (years or total minutes per day) to inclusive classroom environments and exposure to co-teaching (special education) classroom environments as independent variables and achievement scores on the NWEA MAP assessment as the dependent variable.

Hypotheses

H$_0^1$: There is no statistically significant relationship between the mathematics scores of general education sixth grade students as measured by the NWEA MAP assessment and the amount of time exposed (years) to inclusionary classes over a three-year period.

H$_0^2$: There is no statistically significant difference between the achievement scores of general education sixth grade students as measured by the NWEA MAP assessment and the amount of time exposed (total minutes per day) to inclusionary classes over a three-year period.

H$_0^3$: There is no statistically significant relationship between the mathematics scores of general education sixth grade students as measured by the NWEA MAP assessment and time exposed to co-teaching (special education) classroom environments.

Significance of the Study

“Education is the currency of the Information Age – no longer just a pathway to opportunity and success, but a pre-requisite . . . In this kind of economy, countries who
out-educate us today, will out-compete us tomorrow (Obama, 2008, as cited in deAngelis, 2014, p. 13). The decisions of educators, administrators, and legislators impact the financial cost of schooling as well as the academic and social-emotional growth of students (Pritchett & Filmer, 1977). Unfortunately, due to the limited research on the effects of inclusion practices on general education students in the elementary grades (Fletcher, 2010), education policy decisions are based on financial constraints, past-practice, and/or hunches. Klingner, Vaughn, Hughes, Schumm, and Elbaum (1998) explained that “although discussions of the pros and cons of inclusion are likely to continue, many recognize that what is missing is empirical evidence that documents the effects of inclusion, particularly for students without learning disabilities” (p. 153). As the academic performance of general- and special education students continues to be scrutinized under decreasing education budgets, objective data are needed to guide and support program operationalization. Results from this one-district case study will provide additional empirical data to the body or research on the influence of inclusionary education on non-identified general education students’ academic (math) performance.

Although the analysis for this study is at the school level, the school demographics, population size, and the stability in instructional and philosophical practice are unique. The percentage of economically disadvantaged students was consistent and small (mean 6.58 ± 1.34). The district student mobility rate was below the state average as was the number of staff position changes due to retirement and/or school structures (grade level assignments). In addition, the philosophy of in-class support for special education and at-risk (basic skills) students was well established; at the start of the study the superintendent, Director of Curriculum and Instruction, and Supervisor of
Student Services had already been working as a team for five years. Over the course of the data collection, these key administrators as well as the building principal remained consistent. Another unique feature of the population was the size of the school itself. At each grade level there were ten to eleven homerooms with an average class size of 24 students.

This study varies from other studies based on the number of elementary students analyzed for their exposure (total minutes per day) to inclusive classrooms and their varying years of exposure (one to three). This study extends the data review (years of exposure) to three years while many studies considered only one year of impact (Brewton, 2005; Daniel & King, 1997; McDonnell, Thorson, Disher, Methot-Buckner, Mendel, & Ray, 2003; Saint-Laurent, Dionne, Giasson, Royer, Simard, & Pierard, 1998; Sharpe, York, & Knight, 1994; Trabuco, 2011) or two years of impact (Affleck, Adams, Lowenbraun, & Madge, 1988; Brady, 2010). Much of this empirical research focused on the impact of an inclusionary environment on the academic achievement of special education students and considered the impact on general education students at an ancillary level. This study focused on the impact of an inclusionary environment on general education students, considering the impact of special education and basic skills services over a three-year period.

There has been some doubt concerning the success of inclusive schooling on both identified and non-identified students’ success and of curriculum rigor (Florian, Rouse, Black-Hawkins, & Jull, 2004). When considering and defining the success of students, policy makers must consider the moral and ethical implications of inclusionary practices. Philosophers (e.g., Aristotle, Plato, and Rawls) and researchers (Bandura, Piaget, and
Vygotsky) have considered these implications over time. How “just” is a program if it clearly enhances the performance of one specific group to the detriment of others (Kerzner-Lipsky & Gartner, 1998)? By considering the basis of the theoretical framework and the results from this targeted study, the analysis will provide support and/or question the benefits of the in-class support model for non-identified students. The analysis will provide data on staffing mathematics instruction in an upper-elementary setting to meet the needs of all students that may inform policy and practice for educators, administrators, and legislators.

**Limitations of the Study**

Researchers, theorists, and practitioners must be cautious not to make generalizations and assume correlations between their populations of learners based on the results of this study as several limitations apply. The author’s conclusions were made after careful review of the following limitations:

1. This was a retrospective one-district case study. The program design and delivery models and the data that were evaluated were from archival sources provided to the researcher through superintendent and board of education approval.

2. The data were collected from one district (District Factor Group GH) with one upper elementary building (Grades 4 to 6). Each grade-level cluster averaged about 220 students dispersed among 10 to 11 homerooms.

3. The district administrators, principal, Director of Curriculum and Instruction, and Supervisor of Student Services, were consistent for the placement process of the identified and non-identified general education students.
4. During the one-district case study, all students were heterogeneously grouped.

5. The amount of exposure (average total minutes per day) to support programs varied based on the delivery model used; e.g., co-teaching or basic skills (30 or 44 minutes daily).

6. The students were not randomly assigned to the subgroups; e.g., general education, basic skills, or special education classes. Students were assigned to basic skills classrooms based on achievement scores; the criteria for basic skills instruction were modified yearly in order to provide additional support to as many students as possible (Appendix D). Identification for special education services followed state and federal guidelines.

7. Cohorts of students did not exist as a result of reassignment of students to new classrooms or classes each year.

8. All homeroom teachers and co-teachers had 44 minutes of common planning time, eight periods over the course of the six-day school schedule; school periods were 44 minutes in length. The district follows a six-day (1, 2, 3, 4, 5, and 6) versus a five-day (Monday through Friday) schedule.

9. Team teachers had 44 minutes of common planning time, two periods over the course of the six-day school schedule for a total of 88 minutes within a cycle.

10. Basic skills instructors (BSI) of mathematics were in the classroom for 30 or more minutes daily.

11. Staff grade-level and co-teaching assignments changed throughout the study.
Delimitations of the Study

The results of the study were interpreted after careful consideration of the following delimitations:

1. Data were collected from Grades 3 and 6. The influence of exposure was not studied at other grade levels. Although the longitudinal influence of program delivery was not investigated, the researcher considered making inferences from similar studies (e.g., Brady, 2010).

2. The years of interest for this researcher were from 2003 to 2008, inclusive. These years were chosen based on the researcher’s knowledge of the classroom layouts. The researcher was the principal of the Grades 4 through 6 building from 2004 through 2009 and was appointed as the Director of Curriculum and Instruction in 2009. The possibility of bias exists.

3. Students not on the district rosters for all years of the one-district case study were excluded.

4. Students who were deemed eligible for support services (basic skills or special education) for any period within the one-district case study were excluded from the general education data sample.

5. Since randomization was not possible and qualifications for BSI services varied year-to-year, students with the lowest Rasch Unit (RIT) score had a greater chance of showing more gains than did their peers with higher RIT scores. Some of the students with the lower RIT scores were excluded from the data collection as they were found eligible for BSI.
6. The researcher assumed that all identified students were considered full members of the class regardless of their disability and/or academic weakness.

7. The researcher focused solely on mathematics achievement scores.

8. The data used to determine academic success were limited to spring (post-test) Northwest Evaluation Association Measures of Academic Performance (MAP) scores.

9. The researcher assumed that all students were performing at a maximal level of effort on the spring MAP assessments over the years of the study.

10. The researcher did not include teacher qualifications such as years of service, the ability to differentiate, and openness/understanding of the inclusive environment in the factoring of student academic performance.

11. The researcher assumed that the common planning time was used effectively.

12. The researcher did not include student factors such as intelligence quotient, family background, parent involvement or gender, outside-of-state DFG data.

13. Additional items not accounted for include teaching methods and models (e.g., multiple intelligences, inductive versus deductive, discovery, inquiry-based), classroom environment and culture, time-on-task, length of school day, and administrative styles.

**Definition of Terms**

To clarify terminology, all vocabulary used in this study that may be defined in a special way are included below:

Academic Achievement: The numerical score following the completion of the
computerized assessment, Measure of Academic Performance or MAP, from the Northwest Evaluation Association (NWEA).

Basic Skills Student: A student deemed to receive daily in-class support with either the classroom teacher or the basic skills math instructor.

Co-Teaching: Two certified teachers (general and special education) assigned to work with the students throughout the day. In the case of Grades 4 through 6, the special education co-teacher moves with the students throughout their schedules (e.g., Grade 4 science and social studies; Grades 5 and 6 science, social studies, and mathematics).

District Factor Group (DFG): The ranking of school districts by indicators of socioeconomic status (SES) that was first developed in 1975. Indicators include percent of population without a high school diploma, percent of adults with some college education, occupational status, unemployment rate, percent of individuals in poverty, and median family income. These data are available in the decennial Census of Population. There are eight DFGs ranging from A to J, with A representing the lowest SES group (New Jersey Department of Education, 2009).

Exposure: The amount of time spent per-year or per-day in either a co-teaching (special education) and/or in-class support (basic skills) classroom. Daily exposure (years or total minutes per day) was calculated for each year of the study.

General education Student: “A person age three through 21 who is entitled to receive educational program and services in accordance with federal or state law or regulation” (N.J.A.C. 61:14-1.3, 2007, p. 304). For the purpose of this study, a
general education student is not identified as either a special education or a basic skills instruction (BSI) student.

In-Class Support: The basic skills instruction program in which identified students are educated in the general education classroom with support from an instructor of basic skills.

Inclusive School Environment: An inclusive school environment includes students with individualized education plans (IEPs), 504s, and/or students identified for basic skills mathematics instruction. In an inclusionary setting, support services are brought to the student rather than moving the student to the services (Mastropieri & Scruggs, 2000).

Learning: The act of acquiring new, or modifying and reinforcing, existing knowledge, behavior, skills, values, or preferences and may involve synthesizing different types of information (Schacter, Gilbert, & Wegner, 2011).

Least Restrictive Environment (LRE): Least restrictive environments range from out-of-district placements, private facilities, to full-time attendance in the general education school program. Based on IDEA and the New Jersey Administrative Code educators must ensure the following:

. . . that to the maximum extent appropriate, children with disabilities, including children in public or private institutions of other care facilities, are educated with children who are not disabled; and the special classes, separate schooling or other removal of children with disabilities from the regular environment occurs only when the severity of the handicapped is such that education in regular classes with the use of supplementary aids and services cannot be achieved.

Mainstreaming: The placement of a special education student into one or more general education classes without modifications in the curriculum (Rogers, 1993).


National Center on Educational Restructuring and Inclusion (NCERI): The National Center on Educational Restructuring and Inclusion (NCERI) works to promote and support educational programs where all students are served effectively in inclusive settings.

New Jersey Administrative Code (N.J.A.C.): Includes education rules and regulations that are grounded in the provisions of state education law, including rules that have been adopted or are being considered by the State Board of Education and/or the Commissioner of Education (State of New Jersey Department of Education, 2011).

Northwest Evaluation Association (NWEA): A national non-profit organization that provides research-based assessments, professional training, and consulting services to improve teaching and learning (Northwest Evaluation Association, 2009).

Rasch Unit (RIT): The term RIT score is short for Rasch Unit, a scoring scale named for Georg Rasch, a Danish mathematician. The scale is continuous from 0 to infinity (most student scores are in the 150 to 300 range) with equal intervals between score points across the full range. This equal interval feature makes measuring growth of individual students easy and reliable.
Socioeconomic Status (SES): “A family’s socioeconomic status is based on family income, parental educational level, parental occupation, and social status in the community (such as contacts within the community, group associations, and the community’s perception of the family)” (Demarest, Reisner, Anderson, Humphrey, Farquhar, & Stein, 1993, p. 1).

Special Education Student: A student between the ages of 3 and 21 who is eligible for special education and related services in accordance with federal or state law or regulation.

Tracking: “Tracking is an organizational practice whose aim is to facilitate instruction and to increase learning” (Hallinan & Oakes, 1994, p. 79).

Organization of the Study

Chapter I included a historical overview of the evolution of inclusion in elementary schools in the United States as well as the legal precedents leading up to and providing support for this model. The researcher included the context and statement of the problem, the purpose for the study, research questions, significance of the study, and limitations and delimitations of the one-district case study. Terms were defined to provide clarity and common language. The theoretical framework and a general overview of the organization of the study were also provided.

A review of relevant research, theory, and literature is presented in Chapter II. The literature, presented chronologically and through a historic lens, offers support for and objections to inclusionary practices for identified and non-identified students. Chapter II also delves in to Title I and basic skills services. Through this extensive review a myriad of factors that may influence student achievement including but not limited to
class-size, student-teacher contact time, program coherence, and delivery models are presented. Each of these areas represents an element in the theoretical framework for the study.

In Chapter III the researcher describes the research design and methodology used in this study, including the selection of subjects, instruments, procedures, data collection, data analysis, and hypotheses testing. Moreover, this chapter provides insight into the structures of the school being studied and additional explanations of the variables being explored.

Results of the one-district case study are presented in Chapter IV. This section includes an overview of the data analyses, explanatory and inferential findings for each of the research questions explored, and a summary of the results.

In Chapter V the researcher provides a summary of the relevant findings, recommendations for policy, practice, and future research, and conclusions through connections to the literature.
CHAPTER II
REVIEW OF THE LITERATURE

Introduction

Although current policy and public belief support the practice of inclusion, it remains unclear how the placement of identified special education and basic skills students influences the academic achievement of general education students. The free and appropriate public education of identified students in the general education environment may positively or negatively impact their non-disabled peers’ academic growth. The current performance targets in the state of New Jersey require all schools to increase their proficiency levels in English Language Arts and Mathematics so that by the year 2016 all elementary students in Grades 3, 4, 5, and 6 are 100% proficient in these content areas. Furthermore, individual student growth percentiles are being determined based on students’ performance across the state; these scores are being used to evaluate teacher effectiveness in elementary grades 4, 5, and 6. Increased local, state, and federal accountability demands on educators require findings to assist education administrators to make informed decisions regarding best practices for academic placement of all special education and general education students.

The purpose for this one-district case study was to explain the influence of student exposure to inclusive school environments (in-class support, general education basic skills instruction) and co-teaching (special education) on mathematics achievement of general education elementary students as measured by adaptive achievement tests (NWEA MAP mathematics) over multi-year periods. Specifically, a statistical analysis examined the independent/predictor variable of exposure (time) over multi-year periods
to inclusive classroom environments influence on the dependent variable of mathematics achievement as measured by the NWEA MAP adaptive achievement test.

The review of literature is divided into the following six sections and a summary: (a) Inclusion, (b) Historical Development of Inclusion, (c) A Chronological Review of Inclusion Research, (d) Basic Skills and Inclusion, and (e) Theoretical Framework.

Section 1 presents a chronological review of inclusionary practices, including legal precedence. Section 2 reviews and defines inclusion and the working definition of inclusion for this study. Section 3 summarizes inclusion theory and practitioner comments and follows with a comprehensive chronological review of the research. Rather than focus on the various research designs and purposes, the review presents the various models as well as findings (positive, negative, and/or no findings) in chronological order. Section 4 explores the historical background leading to basic skills identification and the various delivery methods. Section 5 provides a theoretical framework for the study that considers production function theory, moral and ethical implications, and instructional delivery models.

**Literature Search Procedures**

A thorough search of literature pertaining to inclusion and academic achievement was conducted. Additional emphasis was placed on literature that focused on the impact of inclusionary practices on general education students. The review encompassed relevant texts, dissertations, peer-reviewed research articles, and on-line searches (Explorer, Google, Yahoo Education, ED.gov, state.nj.us/education, and nwea.org). Key terms and phrases included the following: history and inclusion, history and special education, inclusion, special education and inclusion, general education and inclusion,
impact/influence of inclusion on non-disabled/general/regular education students, impact/influence of inclusion on disabled/special education students, co-teaching and inclusion, class size, student-teacher contact time, academic achievement/performance, mathematics, special education law, basic skills, and pull-out. The noted terms and phrases were used in isolation and in a variety of combinations to produce the references included in this study. Literature that met one or more of the following criteria were included: experimental, quasi-experimental, non-experimental with control groups, and/or designs that would be considered at least casual-comparative; peer-reviewed journals (non-peer-reviewed literature was only referenced for historical and/or legal purposes); government reports; and literature that emphasized the young learner (i.e., elementary students).

Inclusion

Inclusion is a movement that seeks to create schools and other institutions based on meeting the individual needs of all learners. Students in inclusionary schools respect and learn from one another (Salend, 1998). “The true essence of inclusion is based on the premise that all individuals with disabilities have a right to be included in naturally occurring settings and activities with their neighborhood peers, siblings, and friends” (Erwin, 1993, p. 1). Stainback and Stainback (1990) include factors of true inclusive schools such as “appropriate educational programs that are challenging yet geared to their [students’] capabilities and needs as well as any support and assistance they and/or their teachers may need to be successful in the mainstream. An inclusive school is a place where everyone belongs, is accepted, supports, and is supported by his or her peers and other members of the school community in the course of having his or her educational
needs met” (p. 3). Although the inclusion movement has focused on individuals with special needs, the original intent was to alter the philosophy for educating all students (Ferguson, 1996).

Inclusion is not the same as mainstreaming. Mainstreaming is a term that originated in the 1970s, referring to the practice of permitting special needs students to join the regular classroom for a few hours each day. In mainstreaming, included students do not belong to a specialized environment based on ability; the students are members of the general education classroom (Halvorsen & Neary, 2001). Within the 1994 report from the National Study of Inclusive Education (NSIE), an inclusion environment is described as “providing to all students, including those with severe handicaps, equitable opportunities to receive effective educational services, with the needed supplementary aids and support services in age-appropriate classes in their neighborhood schools in order to prepare students for productive lives as full members of the society” (p. 5).

Inclusion classrooms are more like the real world (O’Neil, 1995; Sapon-Shevin, 1995). John O’Neil (1995) conducted an interview of Mara Sapon-Shevin who is quoted as saying, “As far as rationale, we should not have to defend inclusion—we should make others defend exclusion” (p. 7). Although the work of Sapon-Shevin (1995) focuses on the various benefits of inclusion for gifted students, the themes are aligned to special education considerations: establishing and maintaining a warm accepting classroom community that embraces diversity and honors differences, implementing a multilevel, multi-modality curriculum, preparing and supporting teachers to teach interactively, providing ongoing support for teachers in their classrooms, breaking down the barriers of professional isolation, and involving parents in the planning process in meaningful ways.
The sense of belonging and the synergistic collaboration of student-to-teacher and student-to-student are examples of the benefits of inclusionary schools.

The fact that researchers such as Manset and Semmel (1997) have stated that “inclusion was a moral imperative that did not require research support” (p. 156) contradicts the objectivity of informed education leaders. Cronis and Ellis (2000) stated, “Problems do exist with the research literature in special education. Bias exists due to politics, an overreliance on expert opinion, and ubiquitous screening of negative results” (p. 642). Villa, Thousand, Meyers, and Nevin (1996) suggested general and special education teachers are open to implementing inclusionary practices when given administrative support and opportunities to work together. McLeskey and Axelrod (1999) found an increase in inclusive practices, shifts in classroom delivery practices, and differences between distributions across the states; they also suggested that “general education teachers needed to take on added responsibility for the education of students with learning disabilities” (p. 65). The directives of the federal government (IDEIA) that require public schools to follow policies that include instructing all students in the least restrictive environment must be supported by empirical research.

**Historical Development of Inclusion**

The inclusion of students with special needs into public schools was not always common practice and has evolved over time. “Social, political, legal, and scientific forces have created controversy and fragmentation among professionals and parents of students with disabilities. The consistent controlling force has been, and will likely continue to be, the mandates and funding of the federal government. Social movements have impacted political and legal institutions independent of scientific research” (Cronis & Ellis, 2000,
Applying Foucault’s distinction between “traditional” (positive lens) and “effective” (critical lens) history, LaNee and Frattura (2007), focus on the inequities and injustices intermingled in the special education case law and practices. Special education legislation and judicial decisions based on either perspective may lead to intentional or unintentional discrimination.

One of the first pieces of legislations to provide services to individuals with special needs was Public Law 19-8 which provided land in Florida and Kentucky for facilities for the blind and was enacted in 1827. Public law 34-46 established the Columbia Institution for the Deaf and Dumb in the District of Columbia in 1857. These laws were followed by Public Law 45-186, enacted in 1879, which set aside monies to create asylums for the deaf, the dumb, and the blind. Although Public Law 19-8, 34-46, and 45-186 assisted disabled individuals and their families, these students were not truly included. Desegregation of individuals with special needs gained momentum and strength after the 1954 landmark case of Brown v. Board of Education (347 U.S. 483, 1954) which extended equal protection under the law to minorities.

Previous to the Brown decision, Plessy v. Ferguson (163 U.S. 537, 1896) upheld the constitutionality of state laws permitting racial segregation in public facilities. Based on a seven to one decision, the courts determined that the plaintiff’s argument that separate rail cars did not violate his Thirteenth Amendment right (prohibiting slavery) or his Fourteenth Amendment right (same rights to all citizens). The courts found that the “separate but equal” provisions of private services mandated by state government are constitutional under the Equal Protection Clause. The “separate but equal” doctrine remained intact throughout the states until the Brown decision.
The class action lawsuit against the Board of Education of the City of Topeka Kansas was filed by 13 parents on behalf of their 20 children. The Topeka NAACP recruited the petitioners to reverse the district’s policy of racial segregation; the district maintained separate elementary school facilities for Black and White students. On May 17, 1954, the U.S. Supreme Court ruled unanimously that racial segregation in public schools is unconstitutional and violated the Equal Protection Clause of the Fourteenth Amendment; separate facilities are inherently unequal.

The Brown decision mandated racial integration and allowed advocates for individuals with special needs to campaign for their children’s rights. The education of individuals with special needs was addressed in 1958 when President Eisenhower signed a minor act to diminish the legal disputes; Public Law 85-926 was an amendment to the National Defense Education Act (NDEA) of 1958 and provided financial support to colleges and universities for training personnel in teaching children with mental retardation. The NDEA was further expanded (Public Law 88-164) in 1963 to include the training of college teachers and researchers.

The 88th United States Congress enacted the Civil Rights Act of 1964, which was signed into law by President Lyndon B. Johnson on July 2, 1964. The Civil Rights Act of 1964 was raised by President Kennedy in his civil rights speech of June 11, 1963. Kennedy requested legislation “giving all Americans the right to be served in facilities which are open to the public.” Title III prohibited state and municipal governments from denying access to public facilities based on race, color, religion, or national origin; Title IV encouraged the desegregation of public schools; Title VI prevents discrimination by government agencies that receive federal funds. Although the initial powers to enforce
the act were weak, they were supplemented during later years and laid the groundwork for future civil rights legislation.

President Johnson further influenced public education with the passing of the Elementary and Secondary Education Act (ESEA, P.L. 89-10) in 1965. The ESEA was a part of President Johnson’s “War on Poverty.” The Act funded primary and secondary education while barring the establishment of a national curriculum. ESEA emphasized equal access to education and established standards of accountability in order to close the achievement gaps between subgroups. As advocates for desegregation and integration continued to lobby, Congress mandated a Bureau for Education of the Handicapped (BEH) that was instated in 1967. The BEH became the Office of Special Education Programs (OSEP) and was founded under Title VI of ESEA; its members were the architects for the first Education of the Handicapped Act.

Even with these new laws and public offices, students were being segregated. One seminal case that illuminated these unlawful practices was *Pennsylvania Association for Retarded Children (PARC) v. Commonwealth of Pennsylvania* (1972). PARC challenged a state law that permitted public schools to deny services to children who have not attained a mental age of five years at the time they would ordinarily enroll in first grade. The court found in favor of the petitioner and the state agreed to provide full access to a free public education to children with mental retardation up to the age of 21. The PARC case also established the requirement of an individual education plan (IEP) and that disabled students should be instructed in the least restrictive environment (LRE).

The PARC rulings were enhanced by the holdings in the case of *Mills v. Board of Education of the District of Columbia* (1972). Seven children between the ages of 8 and
brought suit against the District of Columbia public schools. The students who had a variety of mental and behavioral special needs were denied enrollment in the schools. The United States District Court held that school districts were constitutionally prohibited from declining services due to a lack of or inadequate resources under the Equal Protection Clause of the Fourteenth Amendment. Mills further clarified that the education offered disabled students must be meaningful to the student. The PARC ruling determined that education be viewed on a continuum and include teaching students how to handle their environment as well as academics. Moreover, PARC required disabled students procedural protections, which included change in status (suspension, expulsions, reassignment, or transfers out of general education settings). Disabled students had the right to access school records and to be heard and represented by legal counsel. Mills established the fundamental Constitutional right to educate all students with special needs within the public school.

The Rehabilitation Act at Section 504 (Public Law 93-112) was enacted in 1973 and declared that any state or local agencies receiving federal monies must end discrimination in regard to persons with special needs; however Section 504 of the Rehabilitation Act was unfunded and unmonitored and virtually ignored by local and state educational agencies for 20 years. The language of a “free and appropriate public education” (FAPE), is guaranteed under this Act and is defined as “the provision of a regular or special education and related aids and services that are designed to meet individual needs of handicapped persons as well as the needs of non-handicapped persons are met and based on the adherence to procedural safeguards outlined in the law.” Most early lawsuits that may have fallen under PL 93-112 were typically pursued under Public
Law 94-142. Public Law 93-112 was expanded when the Americans with Disabilities Act (ADA) of 1990 was enacted by Congress. The ADA prohibits discrimination based on disability and includes job application procedures, hiring, advancement and discharge of employees, workers’ compensation, job training, and other conditions of employment.

The Education for All Handicapped Children Act (EAHCA or EHA) (Public Law 94-142) was enacted by the United States Congress in 1975. The National Association of State Boards of Education state that as recently as 1974, one million children with special needs remained at home or were institutionalized instead of being part of public schools (NASBE, 1992). All public schools accepting federal funds were required to provide equal access to education and provide one free meal a day to children with physical and mental disabilities. The EAHCA also required schools to evaluate disabled students and create an educational plan that would mirror the educational experience of non-disabled students as closely as possible. The plan had to be created with parental input.

Mainstreaming originated in the 1970s and refers to the practice of permitting special needs students to join the general education classroom for a few hours each day (Lehman, 2004; Zigmond, 2003). Mainstreaming occurred mainly for electives, specials, and lunch. The language of “least restrictive environment” (LRE) is part of PL 94-142. Under the EAHCA parents also had the right to dispute the educational decisions made in behalf of their children. The due process clause and procedures for disputes and judiciary review under the EAHCA were established in order to alleviate the financial burden created by litigation. The Education for All Handicapped Children Act was legislated to meet four objectives:
1. To ensure that special education services were available to disabled students in public schools (e.g., protected under the Fourteenth Amendment)

2. To ensure that the decisions about services provided to disabled students are fair and appropriate (e.g., meet individual student needs, LRE)

3. To establish explicit procedures and protocols for the management and auditing of special education services (e.g., Child Find, assessment (not labeling) procedures, Due Process)

4. To provide funding for the states so that they may uphold the mandates under the EHACA

Public Law 94-142 supported the premise that students with special needs benefited from instruction in the regular classrooms setting. The law specifies that each public agency shall ensure the following:

1. That, to the maximum extent appropriate, handicapped children, including those in public or private institutions or other care facilities, are educated with children who are not handicapped, and

2. That special classes, separate schooling or other removal of handicapped children from the regular education environment occurs only when the nature of the severity of the handicap is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily. (Section 612(5)B of P.L. 94-142).

The National Commission on Excellence in Education that was formed in 1981 by President Reagan produced the report *A Nation at Risk: The Imperative for Educational Reform* in 1983. Even though President Reagan initiated the commission, he did not
appoint the members. The Secretary of Education, T.H. Bell, appointed the 18 members from the private sector, government, and education and included prominent members including Nobel-prize-winning chemist Glen T. Seaborg. The report was considered a landmark in education history due to the findings and assertions that America’s schools were failing. The preamble states the following,

All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost. This promise means that all children by virtue of their own efforts, competently guided, can hope to attain the mature and informed judgment needed to secure gainful employment, and to manage their own lives, thereby serving not only their own interests but also the progress of society itself.

Under the fifth category of the report, Leadership and Fiscal Support, the commission asserted that the federal government should play a role in helping public schools meet the needs of key groups of students (e.g., gifted and talented, socioeconomically disadvantaged, minority and language minority students, and the handicapped). There was a dramatic increase in the number of students being identified as having a learning disability, which between 1976 and 1983 had risen to over one million (U.S. Department of Education, 1991). The role of the federal government in public schools continues to evolve.

The consideration of the appropriate placement was considered under Roncker v. Walter (U.S. Court of Appeals (6th Cir.), 700 F. 2d 1058, 1983). The plaintiff was a nine-year old mentally retarded male. He was classified as trainable mentally retarded (TMR)
with an IQ below 50. The Local Educational Agency (LEA) determined the appropriate placement as a special education setting in a special school. The student’s parents disagreed and requested that he be placed in a setting where he could interact with general education peers. The courts found in favor of the LEA since they had data to support that the student did not make significant progress in an integrated setting and the mainstreaming requirement under the EAHCA allowed schools broad discretion in the placement of students with special needs. The case resulted in the Roncker Portability Test and suggested courts consider the feasibility of a desegregated placement when the segregated facility is considered superior.

The Supreme Court decided that the EAHCA would be the exclusive remedy for disabled students asserting their right to equal access in Smith v. Robinson, (468 U.S. 992, 1984). The plaintiff was an eight-year old student with cerebral palsy. The school district was originally providing services to the petitioner in a program for special needs students in a hospital setting. The district then moved the student to an understaffed and underfunded program in a different hospital. The student’s parents appealed the school district’s decisions through EAHCA processes and then sought judicial review. The United States Supreme Court found the processes under EAHCA as the exclusive remedy for disabled students declaring their right to equal access to public education. The United States Congress passed an amendment to EAHCA permitting parents to collect attorney fees upon winning a case against the school district and to bring lawsuits under EAHCA, §504 or § 193, once the administrative remedies had been exhausted as a result of Smith v. Robinson.
The Regular Education Initiative (REI) was introduced in 1986 and was conceptually supported by Assistant Secretary of Education and Head of the Office of Special Education Programs, Madeline Will. The main goal of REI was to merge special education and general education into one system. These goals were supported by research (Manset & Semmel, 1997). Under REI, the general educators were responsible for the disabled student’s learning. “Central to the Regular Education Initiative (REI) was the theme of reforming special education through reform of general education. Proponents stated that students with mild disabilities were created in part by (a) the failure of regular educators to recognize and share the responsibility for children in the lower end of the continuum of academic and social skills, and (b) a federal policy that encourages the perception that children at the extremes of academic ability were the responsibility of specialists” (Manset & Semmel, 1997, p. 156). “Although well intentioned, the so-called ‘pull-out’ approach to the educational difficulties of students with learning problems has failed in many instances to meet the educational needs of students” (Will, 1986, p. 413). Will’s report further suggested that a fragmented or “dual system” negatively impacted our current programs.

The questions between the appropriate education environment (general education or special education pull-out) and the LRE were further clarified and defined in the rulings under Daniel R.R. v. State Board of Education (U.S. Court of Appeals (5th Cir.), 874 F.2d 1036, 1989). The plaintiff was an elementary student with Down syndrome. The school district argued that the general education classroom was not the appropriate academic environment and that the student would not obtain a benefit from inclusion. The Fifth Circuit Court created a two-part inquiry. The first set of questions focused on
whether the school had taken steps to provide supplementary aids and services to meet the needs of the disabled student. Could the student receive an educational benefit from the general education classroom if modifications were made? The other question focused on whether any detriment would result to the child in the new environment and how his/her presence would impact the learning of his/her peers. The second part of the inquiry investigated the final decision of the district regarding the special education student’s placement. The question focused on whether the student spent all or part of the day in a mainstreamed setting to the maximum extent possible. Although the court found for the State Board of Education, the two-step inquiry better defined FAPE and LRE for future rulings and definition under The Individuals with Disabilities Education Act.

The Department of Education’s Office of Special Education and Rehabilitation Services was renamed in 1990 as the Office of Special Education Programs (OSEP) and is under the auspices of the Office of the Deputy Secretary of Education. The Office of Special Education Programs administers Public Law 101-476, The Individuals with Disabilities Education Act (IDEA). Public Law 101-476 used the work of four mothers from Washington State as a framework, Education for All (HB 90). IDEA applies only to those state and local educational agencies that accept federal funding; i.e., “spending clause” legislation. IDEA focuses on the individual student’s needs as opposed to the student’s condition. Under IDEA a child with a disability has been identified under one or more of the following categories: auditorily impaired, autistic, cognitively impaired (mild, moderate, severe), communication impaired, emotionally impaired, multiply disabled, deaf-blindness, orthopedically impaired, other health impaired, preschool child with a disability, social maladjustment, specific learning disability, traumatic brain injury,
visually impaired, and/or eligible for speech-language services; these titles are based on the State of New Jersey testing codes. Having a disability does not automatically qualify a student for services under IDEA but may qualify him/her for accommodations or modifications under Section 504. The student’s disability may not qualify him/her for services under either IDEA or Section 504. A qualified disabled student requires an individualized education program (IEP) be created to meet and describe the related services unique to the student. IDEA defines FAPE as an educational program that is individualized, designed to meet the unique needs of the child, provides the disabled student with access to the general education curriculum, meets grade level state standards, and benefits the child educationally. Under IDEA public schools must place disabled students in the LRE. Under IDEA disabled students must be educated with their non-disabled peers as long as supplementary aids and services can support this placement. The disabled student must also be integrated into the grade education classroom to the maximum extent possible. A paradigm shift occurred in the 1990s in which special education students’ experiences took place almost exclusively within the general education classroom (Lehman, 2004).

*Greer v. Rome City Schools* (U.S. Court of Appeals (11th Cir.), 950 F.2d 688, 1991) reviewed, defined, and clarified the tenets of LRE. The plaintiff was a ten-year-old girl with Down syndrome and speech and learning disabilities. Her parents attempted to enroll her in kindergarten in her neighborhood school at the age of five. The plaintiff’s parents refused to have her evaluated by the district because of their concern about segregated placement and home-schooled her instead. The parents attempted to enroll her again and refused evaluation by the district at the age of seven. The district initiated
administrative proceedings and the plaintiff attended kindergarten at her home school while due process occurred. Once the hearing officer found in favor of the district, the plaintiff was evaluated. The school district drafted a proposed IEP for the student prior to the meeting with the parents of the plaintiff. The district proposed that the student attend special education classes in a different district school. In the end, at the age of 11, the courts found in favor of the plaintiff. The district did not consider placement in the general education setting; they did not consider the full range of supplementary aids and services. The school district made no effort to modify the grade level curriculum.

Furthermore, the school district arrived at an IEP prior to the placement meeting, which by law, needed to include parental input. The district did not follow IDEA.

The background of the *Oberti v. Board of Education of the Borough of Clementon School District* (U.S. District Court (3rd Cir.), 995 F.2d 1204, 1993) mirrors much of *Greer*. The district recommended placing the student in a segregated classroom in a different district over an hour from his home prior to the student ever enrolling into kindergarten. After much discourse and a due process hearing, the parents agreed to a compromise with the student spending limited time in a general education setting in their home school without adequate supports. After discovering that the student was not having any contact with his non-disabled peers during the school day, the parents filed another due process complaint. The courts upheld that the district must consider the full range of supplemental aids and services before segregating students, they must make efforts to modify the curriculum, and the services provided must meet the unique needs of the student. The opinion found under *Oberti* set a high standard for districts to justify
segregating disabled students and put the burden of proof upon the placement decision on the district.

The factors determining LRE under IDEA were further clarified during the *Sacramento City Unified School District Board of Education v. Rachel Holland* (U.S. Court of Appeals (9th Cir.), 14 F.3d 1398, 1994) case. The petitioner was an 11-year-old mentally retarded female. The petitioner’s parents requested that their daughter be placed in a general education classroom for the entire school day. The LEA stated that the disability was too severe and that the student could participate in general education non-academic classes. Four factors were included in the ruling:

1. The educational benefits of the special and general education settings
2. The non-academic benefits which included social interactions with non-disabled peers
3. The effect of the disabled students’ placement on the teacher and general education students
4. The cost of supplementary versus replacement services

The final ruling put the burden of proof for demonstrating that the proposed placement had or would provide mainstreaming to the maximum extent possible on the district. The District court found in favor of the parents and upheld the original court’s decision.

President Clinton’s administration attempted to reform education through the passing of the Improving of America’s Schools Act of 1994 (IASA). The IASA reauthorized the ESEA of 1965. The major provisions and reforms included Title 1, charter schools, safe and drug-free schools, professional development, increases in bilingual and immigrant education funding, impact, and educational technology
programs. The IASA impacted special populations which included students from low-income families and migrants through Title 1. Title 1 helped funnel monies to lowperforming schools and low-performing students through the professional development and services for at-risk students. One of the goals of Title 1 is to assist low-performing schools and students raise their educational standards and assessment scores.

President Clinton signed into law Goals 2000: Educate America Act, (Public Law 103-227) on March 31, 1994. Based on the tenets of outcomes-based education, the Act provides resources to states to ensure that all students reach their full potential. Outcome-based education focuses on the students’ ability to demonstrate the skills and course content that are required. Many people see Goals 2000 as the predecessor to No Child Left Behind. The Act included goals such as having all children in America starting school ready to learn, increasing high school graduation rates to 90%, having students in Grades 4, 8, and 12 demonstrating competency, increasing United States students’ standings to number one in mathematics and science achievement, having every adult be literate so that they can compete in a global economy, having safe and drug-free schools, providing for professional development for America’s teachers, and increasing parent involvement in their children’s education and learning. Goals 2000 was a “call for an inclusive approach to achieving higher educational outcomes for all students, including those with special needs” (Baker, Wang, & Walberg, 1994, p. 33).

Public Law 105-17 (IDEA) was amended by Congress in 1997 and included several significant changes. The changes included provisions that encouraged the placement of students with special needs in inclusive settings (Turnbull, Turnbull, Shank & Leal, 1999). Developmentally delayed children between three and nine years of age
were included in the definition of disabled students. In response to increasing litigation, the Act required and provided a process (mediation) for parents to attempt to resolve disputes with schools and the Local Educational Agencies (LEA). Additional grant monies were made available for technology, disabled infants and toddlers, parent training, and professional development. The amendments to IDEA have strengthened the belief that students with disabilities could be educated in the general education setting while clarifying the procedures to do so (Etscheidt & Bartlett, 1999). Robert T. Stafford, the Republican Senator from Vermont, one of the bill’s primary sponsors, has argued that the legislation is essential if we are to allow children with special needs to live ordinary lives (Arnold & Dodge, 1994). IDEA 1997 may be thought of as the Inclusive Development and Expansion Act (Kerzner-Lipsky, & Gardner, 1998).

The tenets of LRE and FAPE were challenged in the case of Hartmann v. Loudoun County Board of Education, (U.S. Court of Appeals (4th Cir.) 118 F. 3d. 996, 1997. The plaintiff was an 11-year-old male with autism. The student was placed in a full-time general education setting with an aide and a smaller class size. His teacher read extensively about autism and the principal provided training for the staff in regard to autism and inclusion. The student engaged in disruptive behaviors, which included screeching, hitting, pinching, kicking, biting, and removing his clothing. At the conclusion of the school year, the IEP team determined that the student had made little academic growth and recommended the student be placed in a special education class structured to meet his needs; he would still be mainstreamed for non-academic subjects. The parents disagreed and filed due process. The hearing officer and State Review Board found in favor of the LEA. The District court ruled in favor of the parents. The LEA
appealed and the U.S. Court of Appeals ruled in favor of the LEA, finding that IDEA established presumption and not inflexible mandates on mainstreaming. In light of the four factors in the *Holland* case, the student was appropriately placed in a special education classroom.

The No Child Left Behind Act (NCLB) of 2001 (Public Law 107-110), was a reauthorization of the ESEA, which required states to develop standards of proficiency measured through testing basic competencies (skills) in English Language Arts and mathematics. The states determined benchmark goals needed and included standards for students with special needs and subpopulations (e.g., economically disadvantaged, student from major ethnic and racial groups, students with special needs, and students with limited English proficiency (Orlich, 2006)). States also had to determine or restructure teacher certificate standards. NCLB mandated all teachers meet the highly qualified teacher (HQT) requirements in order to instruct specific grade levels and content areas. Schools receiving Title I funding had to set and attain adequate yearly progress (AYP) or face sanctions from their state. Schools that performed well under the new mandates received financial incentives. Schools that did not do well were projected to lose funding through various “corrective actions.” The school-wide testing (AYP) and teacher (HQT) results had to be made public under the new requirements of the ESEA. The NCLB Act was a major catalyst for change and has set the present educational climate in the United States.

IDEA was reauthorized and amended by President George W. Bush in 2004 as Public Law 108-446, the Individuals with Disabilities Education Improvement Act (IDEIA). Several IDEIA provisions were aligned to the NCLB Act of 2001. The
alignments included the implementation of three-year trial IEPs for 15 states, revisions of evaluation requirements for children with learning disabilities, and additional discipline guidance for disabled students. Prior to this reauthorization, the 1998 Annual Report to Congress indicated that in 1995-1996, 42.4% of students with mild disabilities were taught in inclusive settings (U.S. Department of Education, 1998).

The opening of the U.S. Department of Education’s report, A Nation Accountable: Twenty-five Years After a Nation at Risk states, “If we were “at risk” in 1983, we are at even greater risk now. The rising demands of our global economy, together with demographic shifts, require that we educate more students to a higher level than ever before. Yet, our educational system is not keeping pace with these growing demands” (p. 1). President Barack Obama and Secretary of Education Arne Duncan responded to this and other educational demands by announcing Race to the Top on July 24, 2009. Race to the Top was a $4.35 billion incentive plan in which states could compete for these monies by satisfying certain educational policies and practices. State were awarded points for setting performance-based standards for administrators, teachers, and students, complying with the Common Core State Standards, lifting caps on charter schools, focusing on achievement and growth in the lowest-performing schools, and building data systems. Forty-five states, the District of Columbia, four territories, and the Department of Defense Education Activity have adopted the Common Core State Standards as of January 2014.

Additional monies were made available to schools under the American Recovery and Reinvestment (ARRA) Act of 2009 (Public Law 111-5) that was enacted by Congress on February 17, 2009. In response to the Great Recession, ARRA was enacted
to save and create jobs, provide temporary relief programs, and to invest in America’s infrastructure, education, health, and renewable energy. ARRA provided block grants to school districts to fund special education and NCLB as well as Head Start initiatives.

In summary, the evolution of inclusionary education in America’s school has been driven by principles, politics, and (legal) policy. The increasing accountability demands coupled with the legal mandates in regard to a free and appropriate education in the least restrictive requirement call for education leaders to use concrete objective data to make decisions in the best interest of all of their students. The positive influence of inclusionary practices has been supported in some of the research in behalf of the identified special education student. Researchers support that inclusive classrooms are more like the real world that students with special needs will live in when they finish school (Sapon-Shevin, 1995); however, there is limited research on the impact of inclusion on non-identified general education students’ academic growth. The new iteration of the ESEA calls for all students to race to the top. Basic proficiency is no longer acceptable. How does inclusion impact general education students’ learning?

A Chronological Review of Inclusion Research

When determining the best educational environment for all students, the diverse needs of all students must be considered. Heller, Holtzman, and Messick (1982) found the classification and placement of students in special education ineffective and discriminatory; there was no educational defense for maintaining separate programs for Title I and special education students. Special education in pull-out programs has left many students with fragmented educations and feelings that they belong in neither the general or special education classroom (National Association of School Boards of
Education, 1992). Peltier (1997) illustrated similar problematic impacts of inclusion research: (1) many of the studies are limited to early childhood, and (2) the research is descriptive or quasi-experimental. Zigmond (2003) suggested that the empirical research base was insufficient, flawed, and often inconclusive.

When asking the question about the best educational environment for students, the needs (educational and social-emotional) of general and special education students must be considered. Zigmond, Jenkins, Fuchs, Deno, Fuchs, Baker, Jenkins, and Couthino (1995) found that the data from their three studies suggested that “general education settings produce achievement outcomes for students with LD [learning disabilities] that were neither desirable nor acceptable” (p. 539). McLeskey, Waldron, Zigmond, and Jenkins (1995) counter the Zigmond et al. (1995) article, stating flaws in their understanding of the implementation of inclusion (an evolutionary process) and their statistics (unrealistic levels of attainment expected by identified students). “There is now substantial evidence that most, if not all, children with disabilities, including children with severe disabilities, can be educated appropriately without isolation from peers who do not have disabilities” (Ringer & Kerr, 1988, p. 6).

Heubert (1994) delineated some of the philosophical assumptions of inclusionary practices. Labeling and segregation of students was not bad if the labels were accurate and appropriate services provided in another environment. Proponents of inclusion do not see students with disabilities as distinctly different. Heubert stated that proponents often argue that segregated education services are expensive and disjointed, while opponents argued that the inclusionary services are expensive and redundant. Dual systems expended considerable time, money, and effort to determine who was regular and special
although classification was often unreliable, stereotyped students, and was of little instructional value (Stainback, Stainback, & Bunch, 1989). The practice of exclusion contributed to a lack of coordination, clouded responsibility, obscured lines of accountability, isolated and minimized communication between general and special education teachers, and fractured instruction (Will, 1986). Reynolds (1988) reviewed the literature and found “no advantages for special education placements” for disabled students in exclusionary environments (p. 355); exclusion does not prepare disabled students for the real world.

Opponents of inclusionary practices argue that self-contained special education services were sophisticated and reliable. Heubert (1994) suggested that there was general consensus regarding inclusionary practices shared by proponents and opponents. Appropriate staff development and administrative support allowed more disabled students to be served in general education environments. Students with disabilities could be better served through the coordination of general and special education services. Both sides agreed that stronger research was crucial for serving students in inclusionary classroom environments (Galis & Tanner, 1995; Heubert, 1994).

Albert Shanker’s 1995 article, “Full Inclusion is Neither Free Nor Appropriate,” discussed the legal, financial, and academic impact of thoughtless full inclusion initiatives. The issue of equity was offset by the appropriateness of the educational setting and the financial burden laid on the district in order to appropriately implement the needed student services. He argued that the comparison to racial segregation is “faulty.” The African-American children were excluded based on the color of their skin, which is irrelevant to their ability to perform in a general education classroom. Shanker (1995)
discussed the academic impact of inclusion for the non-disabled students. If inclusion is not done correctly and/or if the setting is not appropriate for the disabled students, it can have a negative impact on the academic achievement of the non-disabled students in the classroom. Kauffman, Gerber, and Semmel (1988) further capture the complexity of teaching and learning through this comparison from Lincoln’s observation: “Good teachers can teach all of their students effectively some of the time, and they can teach some of their students effectively all of the time, but they cannot teach all their students effectively all of the time” (p. 10). The following chronological review of inclusionary research examines the aforementioned arguments.

Affleck, Adams, Lowenbraun, and Madge (1988) reviewed the academic viability and effectiveness of the integrated classroom model (ICM) versus the resource model. The University of Washington and the Issaquah School District developed a service delivery model for mildly handicapped children. The handicapped children were in the general education classroom for the full day at a 1 to 2 ratio; average class size of 24. The general education teachers that were involved in the ICM delivery had to have “successful teaching experience, ability to individualize and adapt curriculum and behavior management techniques, effective communication and classroom management skills, and flexibility” (p. 340). Each classroom was assigned 1½ to 3 hours of aide time per day in addition to the ICM teacher.

The authors conducted a nonequivalent control group design (Campbell & Stanley, 1966), converting the age percentile scores of the reading, math, and language scores of the Woodcock-Johnson Psycho-Educational Battery test to the normal curve. There were no significant differences between the handicapped children in the ICM
classes versus the resource room settings in reading and language. The integrated special education students’ math score were significantly higher during Year 1. The California Achievement Test Battery was administered to the general education students in the fall of Year 1 and Year 2. The general education students showed no significant difference in the ICM versus general education settings over the three years of the study. Although there was no evidence of academic gains (special education) or losses (general education) in this study, there was a saving in resource room full-time teaching ($13,590) and general education teaching ($41,250) with an overall saving in the ICM model of $54,840; these savings are based on a school with a student population of 450.

Jenkins, Jewell, Leicester, Jenkins, and Troutner (1991) examined the impact of the implementation of inclusion classrooms on handicapped, at-risk, and general education students. Grades 1 through 6 students (332 and 209) from two K-6 elementary schools participated in the study. School 1 had 20 students classified as learning disabled, two mildly retarded, and one severely behaviorally disabled; School 2 had 32 LD, one MR, and two SBD students. Both schools received Title 1 monies for remedial programs.

One school was designated as the control while the other served as the treatment group. All students were administered the Basic Academic Skills Samples (BASS) assessment in math, written expression, spelling, and reading. Additional measures included the Passage Reading Tests, Gates-MacGinitie Reading Test (varied by grade level), Woodcock-Johnson Psycho-Educational Battery, and the Walker-McConnell Scale of Social Competence. The treatments included the Cooperative Integrated Reading and Composition (CIRC) procedures in 6th grade, cross-age tutoring in first, second, and
third grades, and in-class teaching specialist at all grade levels. Most supports were delivered in the classroom. The researchers found mixed results.

A MANOVA was conducted to analyze the effect that CIRC had on the treatment group. The data revealed no significant difference between schools $F(4, 113) = 1.08, ns$ (Wilk’s lambda = 0.963); student type $F(8, 266) = 0.72, ns$ (Wilk’s lambda 0.951); or interaction $F(8, 266) = 1.41, ns$ (Wilk’s lambda 0.907). When reviewing gain scores, the researchers found significant differences for School 1 (treatment) in the BASS sub-test written words, $F(1, 120) = 4.76, p < .05$. There was no significant difference between the social behavior between the schools, $F(4,32) = 0.58, ns$ (Wilk’s lambda 0.92). The results of the ANCOVA on the cross-age tutoring data revealed no significant difference, $F(1,30) = .40$. When analyzing the achievement scores, a significant difference between the special education students in each school, favoring School 1, $F(5,27) = 3.94, p < .01$ and a significant effect favoring School 2 on math problems correct, $F = 16.00, p < .01$ were observed. The Woodcock-Johnson and Gates-Mac-Ginitie data revealed no significant effect. The data identified differences in social behaviors as follows: special education students scored below remedial students and general education students and remedial students scored below general educations students; these data varied slightly between teacher- and peer-preferred measures. The Neuman-Kuels tests identified differences between the students’ classifications; general and remedial-education obtained higher post ratings on the peer-preferred behaviors than their special education peers. The authors stated, “Overall, none of the three intervention components had much influence on the academic achievement or rated social skills of students, nor did this
intervention program influence teacher judgments about the character and quality of support services for low achieving students” (p. 318).

Sharpe, York, and Knight (1994) completed a preliminary study to investigate the effects of inclusion on elementary students (Grades 3 and 4) without disabilities. The 143 general students that were participants in the study were from an elementary school in rural east central Minnesota. The school housed 640 students in Grades K through 6 with an average class size of 30. The researchers defined the student population as 96% European American and 4% minority (primarily Native American). Twenty percent of the families were living below the poverty level as defined by the federal government.

Five special education students that were formerly instructed in a self-contained classroom were included in the general education classroom environment. Prior to their inclusion, the principal and the involved faculty expressed an interest in the study; they all participated in training. Professional development topics included a rationale for inclusion, developing individualized programs, promoting peer support, and clarifying roles and responsibilities of teachers and paraprofessionals.

Through a quasi-experimental design, the students that were part of the comparison group (n = 108) and the inclusion group (n = 35) were measured pre- and post on the Science Research Associates (SRA) reading levels as defined by Houghton-Mifflin and report card data (general performance and conduct). One-way ANOVA revealed no statistically significant differences were found between the pre- and post-test data between the two groups. The SRA achievement, reading level, and teacher report card data demonstrated no difference after one or two years of participation/non-participation. The authors found no decline in “academic or behavioral performance of
classmates educated in inclusive classrooms of the standardized test and report card measures employed” (p. 286). The authors’ findings yielded the following results in reading ($F$-ratio = .160, not significant), language arts ($F$-ratio = 1.024, not significant), mathematics ($F$-ratio = 0.728, not significant) and the composite score ($F$-ratio = 0.800, not significant). The ratio of SE to GE students, 2 to 30, may limit the generalizability to other populations/schools.

Baker, Wang, and Walberg (1995) summarized the research of impact of inclusion classroom environments on students’ learning and social relations. The researcher’s gathered qualitative data from five school sites in five different states (KS, MN, PA, VA, and WA). Their meta-analysis found a small-to-moderate beneficial effect size (.08 to .44) on the academic and social impact of these environments on special-needs students. “Although estimated effects vary across individual studies, they have rarely shown negative effects for inclusion” (Baker, Wang, & Walberg, 1995, p. 33). They further stated, “Considerable evidence from the last 15 years suggests that segregation of special students in separate classrooms is actually deleterious to their academic performance and social adjustment and that special students generally perform better on average in regular classrooms” (p. 34). “The concern is no longer whether to provide inclusive education but how to implement inclusive education in ways that are both feasible and effective in ensuring schooling success for all children” (p. 34). Their work demonstrated an impact on and need for educational policy reforms and personnel preparation when implementing inclusive classroom environments.

The impact of inclusive education on the academic achievement, student behavior, and self-esteem of non-disabled third- through fifth-grade students was
investigated by Daniel and King (1997). The researchers used a quasi-experimental design comparing the dependent variables based on students’ previously assigned participation in four non-inclusive (n = 68), two clustered inclusive (n = 34), and six random inclusive classrooms (n = 105).

Daniel and King (1997) reported significant differences in general education student performance in the Grades 3, 4, and 5 inclusive classrooms. The discriminant analysis indicated the following effect size in Grade 3 = 34.6% (Wilk’s Lambda Λ = 0.65, p < .01), Grade 4 = 31.2% (Wilk’s Lambda Λ = 0.69, p < .10), and Grade 5 = 37% (Wilk’s Lambda Λ = 0.63, p < .01). The data indicate statistically significant differences in the performance of non-inclusion versus randomly assigned inclusion students in third grade reading and fourth grade mathematics gain scores. The fifth grade students in the study experienced fewer behavior problems in the random inclusion classrooms. Their data “indicate few notable differences in academic achievement among students in inclusion versus non-inclusion classrooms” (p. 77); however, the students’ (non-disabled and disabled) perceived self-esteem was uniformly lower among all students placed in inclusive classrooms. The authors caution education leaders from making delivery decisions based on the thought that inclusion will benefit the non-disabled students academically.

Saint-Laurent, Dionne, Giasson, Royer, Simard, and Pierard (1998) investigated the effects of an in-class service model on students with and without disabilities. The researchers investigated the academic achievement of White third-graders (n = 606) identified as at-risk for school failure. Four criteria were used to identify the students: (a) low results on Grade 3 tests of reading, writing, and mathematics, (b) teacher ratings, (c)
grade retention, and (d) identification as a special education student. The student sample came from two main urban areas in Quebec and had the following socioeconomic breakdown: 276 high SES, 145 middle SES, and 182 low SES schools.

Students in the treatment group were included in the Programme d’intervention après des élèves a risqué (PIER), which was theoretically based on the work of the socioconstructivist constructs of Vygotsky (1978). Students received scaffolded instruction which included collaborative consultation, cooperative teaching, parent involvement, and strategic adaptive instruction in reading, writing, and mathematics.

General education students in the treatment group scored significantly higher on the reading ($F(1, 513) = 5.56, p < .025$), writing ($F(1, 513) = 8.95, p < .01$), and mathematics ($F(1, 513) = 29.26, p < .001$) measures based on two multivariate analyses of covariance. The pre-test scores served as the covariate. The researchers stated, “General education students were not held back by the presence of at-risk students who were present in the classroom” (p. 248). The general education students benefited from the additional interventions provided through PIER; e.g., instructional strategies and additional staffing. The researchers did not find significant academic growth for the learning disabled (LD) students. Generalizations with these results are cautioned since the student placement was not randomized and staff participation was voluntary.

The varied impact of inclusive practices on students of mixed abilities was supported through the research of Huber, Rosenfeld, and Fiorello (2001). Huber et al. studied the influence of inclusion and inclusive practices on high, average, and low performing general education students. The researchers sampled a total of 477 students (male and female) from Grades 1 through 5. The students were randomly selected from
elementary schools across the district; 27 classrooms were sampled. The researchers described the district as a primarily working-class population with an ethnic distribution of 72% White, 27% African American, and 1% Asian students. For the investigated school years, 50% of the students received free or reduced-cost lunches. The research was refined from Huber’s (1998) earlier dissertation work.

The researchers reviewed the incremental changes in general education achievement scores for high, middle, and low performing students over a three-year period as inclusive school practices were implemented. The researchers also reviewed the achievement results in relation to the number of identified students within the classrooms. Achievement levels in mathematics and reading were determined separately using the results of the Metropolitan Achievement Test (MAT). The impact of inclusion and inclusive practices was determined by the results of the MAT in Year 1 and the Stanford Achievement Test in Years 2 and 3 (Huber et al., 2001).

Huber, Rosenfeld, and Fiorella (2001) used a balanced factorial design to complete the analysis of variance with repeated measures to determine the change in scores. The researchers’ analysis indicated that the students’ initial achievement level had a statistically significant effect on their incremental change (achievement growth). Students from the low and middle groups had higher reading and mathematics change scores over the two years of inclusion than their high ability peers \((F(2,498) = 12.86, p < .001)\) and \((F(2,546) = 26.85, p < .001)\), respectively. The researchers reported, “Students who had lower academic skills before the restructuring appeared to benefit academically when inclusive practices were implemented schoolwide, while students with higher skills lost ground” (p. 502). Within this study these changes appeared less pronounced in the
ensuing school years. Due to the large sample size, this is a strong study; however, there are at least two limitations to be considered. The special education population was not diverse. The majority of the students were identified as learning disabled. Additionally, the reading program was changed to a whole language delivery model halfway through the study and may have negatively impacted reading achievement based on a de-emphasis of phonics.

McDonnell, Thorson, Disher, Mathot-Buckner, Mendel, and Ray (2003) examined the influence of inclusive environments on the achievement of students with and without developmental disabilities in a quasi-experimental pretest-posttest design. The participants of the study were from five elementary schools from four different schools in rural, suburban, and urban settings. The principals and teachers of the schools had to express an interest in participation for study inclusion. The students in the study were all enrolled in age-appropriate grade-level classes in first through fifth grade. The researchers compared the achievement scores of 324 students without disabilities enrolled in classes with students with disabilities to 221 students in non-inclusive classes. Achievement was based on mandated state level criterion-referenced tests in reading/language arts and mathematics. Using the Wilcoxon Signed Rank Test, the researchers investigated the students with disabilities adaptive behavior.

McDonnell et al. (2003) completed a one-way ANOVA and found no significant difference in reading/language ($F = .02; p = 0.87; df = 1,543$) or mathematics ($F = .39; p = 0.52; df = 1,543$) between the general education students enrolled in inclusive classrooms and those who were not. The students with disabilities enrolled in the inclusive classrooms made a significant ($Z = 3.18; p = .001$) gain in their adaptive
behavior as measured by the Wilcoxon assessment. The authors reported “that the presence of students with developmental disabilities in general education classes did not negatively impact the educational achievement of students without disabilities” (p. 235). Generalizability of these results is cautioned since the special education student population was limited and staff participation was motivated by resources (training and curriculum support/revisions).

Dyson, Farrell, Polat, Hutcheson, and Gallannaugh (2004) gathered researchers from the University of Manchester and the University of Newcastle to review the large-scale impact of inclusion in England. Review of the archival data of the National Pupil Database found 16 case studies of highly inclusive schools. The researchers investigated the impact of inclusion on pupil achievement. The findings included no evidence of a relationship between a Local Education Agency’s (LEA) level of inclusion and student achievement and a very small negative relationship between a school’s level of inclusion and student (general education and special education) achievement ($\beta = -.156; t = -102.618; p = .000 < .05$). Inclusive schools that had higher levels of flexibility when grouping students, customized and monitored education plans for all students, and had school-wide strategies for raising attainment outperformed other schools based on student achievement scores.

Brewton (2005) investigated the effects of inclusion on the mathematics achievement of general education middle school students. The student sample was comprised of 1560 students from two urban New Jersey middle schools. Special education and general education teachers provided support in inclusive classes while only general education teachers worked in the non-inclusive classrooms. The math assessment
scores were generated from 1002 general education students in non-inclusive classrooms and 104 general education students in inclusive settings in Grades 5, 6, 7, and 8. The Grades 5, 6, and 7 student achievement scores were measured by the Standard Proficiency Assessment (SPA), while the Grade 8 students were measured based on the New Jersey Grade Eight Proficiency Assessment (GEPA).

Through independent $t$-tests, the researcher investigated the difference in the achievement scores of general education students in inclusive and non-inclusive classrooms. Brewton (2005) found no significant difference between the two groups of students, $t$-test = 1.746, $p = .083$. The researcher also explored the proportion of the variance influenced by sample size using Cohen’s guidelines (Cohen, 1988) and found little if any effect. Brewton’s results demonstrate “that general education students are not affected by having disabled students in the classroom during math instruction” (p. 76).

McCartney (2006) investigated the effects of inclusive environments on the academic achievement of general education elementary students over a single and multi-year period. The participants of the study were elementary students in a Grades 2-6 elementary school in a rural/suburban New Jersey school district. The testing sample included 318 fourth, 329 fifth, and 332 sixth grade students. The different environments included inclusion, non-inclusion, and self-contained classrooms; the self-contained classrooms were not part of the statistical analysis. Additional demographic variables included gender and race (Caucasian, African American, Hispanic, and other).

The researcher gathered historical data on the NJ ASK and CTB McGraw-Hill Terranova test for the students and completed independent $t$-tests, single-sample $t$-tests, two-tailed $t$-tests, and $t$-tests for matched pairs. The analysis compared the scores of
general and special education students’ scores on the two measures in similar environments as well as the difference between the inclusive and non-inclusive setting.

McCartney (2006) found a statistically significant difference between the mean scores of general and special education students at each grade level based on the Terranova and NJ ASK results; the general education students consistently outperformed their special education peers in inclusive and non-inclusive environments. The researcher found no difference between the performances of general education students in inclusive versus non-inclusive environments on most indicators. The data demonstrated a difference in sixth grade Terranova scores in the two environments; the general education students in non-inclusive classrooms outperformed their general education peers in inclusive classrooms. Overall, McCartney’s data found that inclusive environments did not impact elementary students’ academic achievement in ELA or math.

Demeris, Childs, and Jordan (2007) studied the impact of special education students on the large-scale achievement scores of general education students in Grade 3 classrooms. The authors included all students (N ~ 128,160) that were registered and took part in the Ontario provincial assessment in reading, writing, and mathematics. Special needs students were identified through an identification, placement, and review committee process; because of the different identification processes, the researchers included identified students as well as those having individualized education plans.

Demeris et al. (2007) calculated means and standard deviation for all measures (reading, writing, and mathematics) including the number of students with special needs in each classroom, class size, and the SES of the school. Controlling for class-size and
SES, correlations among the variables were completed. A regression analysis was completed to determine the impact of each variable on the achievement scores.

Through the completion of the regression analysis controlling for class-size and SES, the authors found mixed results. The correlation between achievement scores and the number of students with disabilities in the classroom was not significant (−.032 to .10). Class size was found to be negatively correlated with achievement scores but only statistically significant in the area of mathematics (−.057), accounting for 30% ($R^2 = .003$) of the variance. “In summary, the zero-order correlations with the achievement scores suggest that higher class average scores accompany higher socioeconomic status and that, for mathematics, larger class size accompanies slightly lower achievement scores” (p. 619). When controlling for the other sources of variance, the authors found students with special needs performed slightly better as the number of students with special needs increased within their classroom. Overall, the students without special needs achievement scores were not impacted by the presence of their identified peers.

Brady (2010) investigated the influence of inclusion on language arts literacy (LAL) and math achievement of non-disabled middle school students. The school was located in the suburbs of central New Jersey in a District Factor Group of I, with A being the lowest socioeconomic status and J being the highest. The student sample was from sixth and seventh grade students and varied from 223 to 245 at each grade level over the course of the two years of data review. Academic achievement was defined by the state assessment, the New Jersey Assessment of Skills and Knowledge (NJ ASK) in Language Arts Literacy and Mathematics.
The researcher used a non-experimental longitudinal explanatory study, Type 9 (Johnson, 2001). Through two-tailed t-tests the differences between non-disabled students in inclusive classrooms were compared to students in non-inclusive classrooms. The data from students in classrooms defined as “high” achieving were excluded from the study.

Brady’s (2010) research found that inclusion did not have a negative influence on the academic achievement of non-disabled students. Through the independent t-test and after testing for the variance, Levene’s Test for equality of variance, and including a review of the effect size, Cohen’s $d$ effect, there was no significant difference for the sixth grade (Year 1 mean = 231.19, mean difference = 9.41, $p = .111$: Year 2 mean = 227.20, mean difference = 3.76, $p = .372$) in LAL. The seventh grade difference in LAL was found to be significant for both years (Year 1 mean = 237.49, mean difference = -8.26, $p = .047$: Year 2 mean = 236.72, mean difference = -9.24, $p = .038$); students in inclusion classrooms did slightly better than their non-disabled peers in non-inclusive classrooms with an effect size of $d = -.353$ and $d = -.382$, respectively. The analysis was repeated for mathematics. In years one and two, the non-disabled students in sixth grade inclusive classrooms did slightly better on the NJ ASK Math (Year 1 mean = 235.18, mean difference = -11.00, $p = .005$: Year 2 mean = 236.66, mean difference = -13.81, $p = .000$) and had an effect size of $d = -1.11$ and $d = -1.11$, respectively. In Year 1, the non-disabled students in seventh grade inclusive classrooms did slightly better on the NJ ASK Math (Year 1 mean = 218.26, mean difference = -13.80, $p = .002$: Year 1 mean = 236.66, mean difference = -13.81, $p = .000$) and had an effect size of $d = -0.686$. There was no statistical significance between the students’ scores in Year 2 for seventh grade.
mathematics (Year 2 mean = 214.70, mean difference = -.40, \(p = 0.919, d = .022\)). The NJ ASK data revealed that non-disabled students in inclusive classroom outperformed their peers in non-inclusive classrooms in language arts literacy and mathematics in Year 1 and 2 of Grade 6. The seventh grade non-disabled students had higher scores in inclusive classrooms in mathematics in Year 1 only. Brady states, “The results of the analyses indicate that the inclusion of special education students and special education teacher in the mainstream class does not hinder the academic achievement of the non-disabled student” (p. 63).

Trabucco (2011) investigated the impact of co-taught inclusion on the mathematics achievement of third grade non-disabled students. The researcher used a casual-comparative ex post facto research design. The data were used to measure the central tendency of each subgroup on the NJ ASK mathematics assessment and independent samples \(t\)-test to identify any significant differences between the groups. The participants in the study were selected from an upper middle class suburban school district in northern New Jersey. The elementary school reviewed 431 students housed in Grades pre-kindergarten through 3 with a class sizes that averaged 20 students. The 99 participants in Grade 3 ranged in age from eight to nine.

The results of Trabucco’s study demonstrated no statistical difference for overall math performance for students placed in inclusion classroom settings versus non-inclusion based on the results of the Grade 3 New Jersey Assessment of Skills and Knowledge \((t = 0.612; p = 0.542; df = 97)\). The effect size was 17%. No statistical difference was found in all cluster scores (geometry and measurement, patterns and algebra, data analysis, probability, and discrete mathematics) excluding one (number and
numeric operations). Numbers and operations had an effect size of 37% ($t = 1.941; p = .042; df = 30.2$). The researcher stated, “Placement in a co-taught inclusive classroom does not influence the achievement of non-disabled students in mathematics with the exception of performance on number and numeric operations” (p. 109-110).

Generalizations to other populations are limited by Trabucco’s research since the population was not diverse, the disabilities of the participating students were vague, and the inclusion sample was small ($n = 15$).

Robinson (2012) investigated the impact of student (student socioeconomic status, race, attendance, and gender) and school (placement in inclusive and non-inclusive classrooms) variables on the academic performance of sixth, seventh, and eighth grade students (approximately 1200). The New Jersey state assessment (NJ ASK) was used to investigate achievement levels in language arts and mathematics. The participants of the study were from an urban lower middle class PreK-12 school district in central New Jersey. The racial makeup of the city at the time of the study was approximately 66% White, 23% African American, 2% Asian, less than 1% Native American, and 5% other races; Hispanic and Latino were about 14% of the population. The school district was identified as a Title 1 and falls within the B district factor group (A being the lowest SES and J the highest). At the time of the study, the district was in Year 3 of being identified as being “in need of improvement” based on NJDOE adequate yearly progress expectations.

Robinson (2012) completed a simultaneous multiple regression analysis to determine the predictive measures (variance) of the independent variables on the dependent variable (student achievement). When comparing the inclusive class students’
scores to their previous years’ scores, general education students performed poorly in language arts ($\beta = -0.331, t = -10.390, p < .001$) and mathematics ($\beta = -0.323, t = -10.466, p < .001$) inclusive environments. The students’ previous years’ scores were also predictive of their success the following year ($\beta = 0.555, t = 17.163, p < .001$). In addition to the regression analysis, Robinson (2012) conducted factorial ANOVAs in order to control for predictive variables (previous scores). Due to the lack of random assignment of participants to the treatment and control conditions and the ex post facto design, the study was non-experimental. Participant samples were pulled from two middle schools.

Robinson (2012) found that within School A and B the placement of non-disabled students in inclusive classrooms did not influence their performance on the NJ ASK in mathematics or LAL in Grades 6, 7, and 8 when not controlling for other factors. The data also demonstrated that within School A the placement of disabled students was a significant indicator of their mathematics ($p < .001$) and language arts ($p < .001$) performance on the NJ ASK. Disabled students performed better in an inclusive environment; however, the placement of disabled students in an inclusive environment was not found to significantly impact mathematics or language arts scores in School B.

When reviewing the statistical analysis and controlling for the general education students’ previous years’ score on the NJ ASK mathematics and LAL assessments, the difference was significant. “Non-disabled students placed in an inclusive classroom scored lower than non-disabled peers placed in a general education classroom” (p. 192). The differences in the schools’ performance led the researcher to discover that one school places additional low-performing math and LAL general education students in inclusive
classrooms. Robinson’s (2012) research supports Slavin’s (1988) 10-30-60 rule for class make-ups; students need quality academic role models.

**Basic Skills Instruction and Inclusion**

To fight the “War on Poverty,” President Lyndon B. Johnson passed the Elementary and Secondary Act (ESEA, P.L. 89-10) in 1965. The ESEA emphasizes equal access to education and established standards of accountability in order to close the achievement gaps between subgroups. The main goal of ESEA was to decrease the discrepancy in achievement (content and skills) scores between low-income urban and rural school students and suburban middle-class students in reading, mathematics, and writing; currently the achievement gap is widening (Reardon, 2013). Students who were targeted in Chapter 1 (Title I) were nearly identical to those in learning disabled programs (Jenkins, Pious, & Peterson, 1988).

Title I was a provision under the ESEA and distributed federal funding to districts and schools with high percentages of students from low-income homes. The basic grant formula provided funding to districts based on the number of poor children they serve (minimum of 10 and 2% of total student population); the concentration grant was based on percentage of students identified as poor with at least 15% of the district population or a total of 6,500 students; the targeted assistance grant focuses on districts with the most needy students and allocates money based on percentages of students within a school (USDOE, 2014). These monies can be used by districts in “schoolwide” or “targeted assistance” programs. Schoolwide programs allow the monies to be used more fluidly for the school population while targeted assistance programs focus on identified students who are failing and/or at-risk of failing. The Act authorizes spending in the areas of
professional development, instructional materials, parent involvement policies and programs, and resources to support educational programs.

The current regulations under the ESEA and Title I specifically provide uniformity through stringent rules that impose punitive actions if districts are out of compliance. This is a polar opposite to the earlier derivations of the Act which had looser regulations and resulted in questionable use of funds. “With few limits on how money could be spent, Title I programs focused more on activities outside the classroom than on academics. Scandals erupted in the late 1960s and early 1970s over schools purchasing audiovisual equipment and other supplies with Title 1 dollars” (Cook, 2005, p. 25). The monies from Title I were to be used for supplementary programs; they could not supplant the general education resources. Acceptable Title I initiatives have included extended school year/day and community school programs (Deich, Wegener, & Wright, 2002). Changes in the amount of funds available (decrease over time) and the acceptable uses (more limited and/or defined) for the funds have evolved into more inclusive classroom models. The impact of Title I programs on student achievement scores coupled with special education settings is not found in the literature.

Sunderman’s 2001 review of *Accountability Mandates and the Implementation of Title I Schoolwide Programs* investigated the impact of different design models on student achievement. Sunderman studied three urban districts with high concentrations of low-income students (Cleveland, Chicago, and Detroit). Through the use of multiple regression analyses, Sunderman examined the relationship between student academic achievement (math and reading), demographic characteristics, school designation (e.g.,
magnet schools), and actual student growth. School and student growth was measured based on expected/predicted and actual student achievement scores.

Sunderman’s findings suggested that a two-tiered system may be developing. Poorly performing schools were more likely to adopt remediation strategies that targeted students, grades, or subjects that reflected the accountability mandates. In schools that were performing better, the administrators found ways to provide the at-risk students more instructional time. Examples include changes in daily schedules and extended school day/year programs; within this model the identified students remained a part of the general education instruction. Sunderman warned that the schools under accountability pressure may be further “stratifying” their at-risk students by placing them in remedial classes. This research further supports the accountability (adequate yearly progress) struggles that some schools face. The ESEA and NCLB legislation enforces state assessment systems that are approved by Title 1. “This creates a challenge for policy makers as well as administrators because the intent of the federal Title I schoolwide program is to reduce stratification among schools and students” (Sunderman, 2001, p. 526).

Recently, the Center on Education Policy (CEP, 2011), reviewed state assessment trends for Title 1 students since 2002. The study compared the reading and mathematics scores from Title I and non-Title I students from 19 states on Grades 4, 8, and 10/11 assessments. The researchers examined the achievement gap between the two populations while also reviewing the mean scores based on the individual scoring scale for each state test(s) in regard to the number of students performing below and above the proficiency level.
The CEPs research found that students participating in Title I had improved achievement scores in 90% or more of the states. “The number of states with gains for Title I students was equal to or greater than the number with gains for non-Title I students” (p. 2). Their data indicated that the gaps between Title I and non-Title I students have decreased at all tested grade levels; Grade 4 was the least significant. The Grade 4 mean score gap in reading between Title I and non-Title I narrowed, widened, and stayed the same in 47%, 40%, and 13% of the states, respectively. The Grade 4 mean score gap in math narrowed, widened, and stayed the same in 44%, 31%, and 25% of the states, respectively. The Grade 8 and high school mean score gap in reading narrowed by 57% and 78%, respectively. The researcher stated that the mean score gaps narrowed in the “majority of the states.” When gaps widened there was growth in the Title I student scores; however, the non-Title I students grew more. The CEP data presented some interesting findings for low-income and students from different racial/ethnic groups. “Gaps between Title I and non-Title I students were generally smaller than the gaps between low-income and non-low-income students, and smaller than African American-White gaps and Latino-White gaps” (p. 3). When reviewing the findings from this research, one must consider the various differences between the state assessments and the flexible means in which state cut-offs are modified and changed.

**Theoretical Framework**

Twentieth century educational practices continue to be investigated in order to determine the influence of a multitude of variables on the academic achievement of students (Caldas, 1993). There are numerous external input factors that may impact student learning as well as school-controlled process factors. Education leaders continue
to explore the internal forces that influence student achievement; e.g., per-pupil expenditure, teacher education, teacher experience, teacher salary, school size, and teacher/pupil ratio. Program delivery, design, and curriculum choices are factors that may also influence student achievement. The American Institute for Research (2010) stated that “education production functions are a way to explore the relationship between schooling inputs and the outcomes they are intended to produce” (p. 1). Education leaders must consider the cost of these initiatives as well as the moral and ethical implications of their choices. Production Function Theory (Pritchett & Filmer, 1997), the relationship between school inputs and student outcomes, serves as the theoretical framework for this study.

Educators argue and the legislation supports an ethical imperative for all students to be included in a free and appropriate education in the least restrictive environment. The guiding principles of justice were defined in John Rawls’ (1971) *A Theory of Justice*. The hierarchy of Rawl’s principles as defined in *Political Liberalism* (1993) declares that the first principle has priority over the second and the first portion of the second principle has priority over the second half. The principles are as follows:

1. Each person has equal claim to a fully adequate scheme of basic rights and liberties, which scheme is compatible with the scheme for all; and in this scheme the equal political liberties, and only those liberties, are to be guaranteed their fair value.

2. Social and economic inequalities are to satisfy two conditions: first, they are to be attached to positions and offices open to all under conditions of fair
equality of opportunity; and second, they are to be the greatest benefit of the least advantaged members of society. (Rawls, 1993, pp. 5-6).

The idea of a society comprised of natural proportions in which isolation is not acceptable was formed long ago. Plato and Aristotle found segregation inconceivable. Men should not deprive other men of their rights to be members of a society. In Plato’s democracy as defined in The Republic, the populace should have equality within political opportunity and individual freedom. “In order to be truly who we are, we must live in the ‘true’ society comprised of natural proportions” (Kraut, 2012, p. 13). Based on the works of Antoine E. Murphy, “Proportional equality relates not only to a simple mathematical formula as used by Murphy, but to looking at a whole individual and deciding what is proportionally adequate for him or her in society. Structurally, inclusion promotes proportional equality insofar as it requires a proportionally natural environment in the classroom for both students with and without disabilities” (Robinson, 2012, p. 98).

George (2005) further argues that in order to provide a learning environment that is more consistent with our nation’s democratic goals, instruction should occur in heterogeneous classrooms providing for social-emotional and academic experiences and growth.

Aristotle taught of virtues; in order to be virtuous one would need to be taught and have experiences. These learnings and experiences would lead to consciously choosing the right path. Inclusion is challenging to argue against. A segregated citizen could not fully participate in society and/or interact with fellow citizens in a non-inclusive environment. The environmental impact of learning is also supported by the works of Vygotsky. Vygotsky (1978) argued that the social environment and culture could impact a child’s cognitive development. Through his work he explored the zone of proximal
development (ZPD), which has implications in this research. One can argue that the amount of guidance, collaboration, and/or scaffolding from teachers and/or peers may impact a student’s individual learning (Vygotsky, 1978); learning can be defined by time of acquisition (rate), depth of understanding, and/or number of skills.

When determining the appropriate educational environment for students, Bandura’s (1977b) social learning theory must be considered. Social learning theory integrates the behavioral and cognitive theories of learning. Through observational learning, self-efficacy, and reciprocal determination, an individual’s growth is impacted. Observational learning requires that an individual must pay attention to the events being modeled, information must be retained, symbolic actions must be transferred to the appropriate actions, and sufficient incentives must be in place so the behaviors are performed (Grusec, 1992). Considering an individual’s persistence, effort, and coping mechanisms for a specific task, one could predict the likelihood an individual would engage in a task and how successful he/she would be; these are the foundations of self-efficacy theory (Bandura, 1977a). Reciprocal determination further helps to determine social learning by considering the bidirectional influence of behavior, the environment, cognition, and other social factors on learning (Bandura, 1977b). When considering the impact of situations and the environment on the academic achievement of students, one must contemplate the social interactions and the nature of the experiences to which the students are exposed.

Piaget investigated the social interactions between children and how these interactions influenced their learning. He proposed that children learn from their more advanced peers and either assimilate (follow existing schema) or accommodate (modify
existing schema) the experience and learning (Omrod, 2012). Piaget’s theories on learning focused on developing schema as an evolutionary or adaptive process and were further refined and defined as Constructivism. Whether taking an outside-in (Vygotsky) or inside-out (Piaget) approach to student learning (Tryphon & Voneche, 1996), one could argue that through either lens there is a strong argument for a push-in model (basic skills and special education) toward inclusion for social-emotional and potential academic gains.

Greenwald, Hedges, and Laine (1996) present the paradoxical relationship between the rising costs to educate our youth and the gains in academic achievement. As the cost of public education has increased, the academic gains of students have not been impacted as significantly. In Coleman’s (1966) *Equality of Educational Opportunity*, the researchers found that school resources had minimal impact on student achievement; the lead variable that influenced student achievement in Coleman’s results was socioeconomic status (SES). The production function theory work of Greenwald, Hedges, and Laine (1996) supported the class-size research of Glass and Smith (1979), Hedges and Stock (1983), and Finn and Achilles (1990). Although some of the data may be skewed because of the difference between class-size and pupil/teacher ratio, in respect to this study, smaller class-size as a result of increased teacher supports and contact time may positively impact student achievement.

Tolerance theory (Gerber & Semmel, 1985) suggested that teachers and schools cannot meet the needs of a diverse student population with a myriad of instructional needs given limited resources. Meeting the needs of student outliers was difficult even in the most exemplary classrooms. Greenwald, Hedges, and Laine (1996) state, “The
The general conclusion of the meta-analysis presented in this article was that school resources are systematically related to student achievement and these relations are large enough to be educationally important” (p. 384). “How we spend the money and the incentives we create for both children and teachers are equally important” (p. 385).

Theoretically, curriculum delivery and classroom design, the pedagogical processes of education, should impact student achievement. Mixed outcomes have been reported and the focus of identified special education and basic skills students as compared to unidentified general education students has varied in importance. The objective of the present study is to examine the influence of general education student exposure levels to inclusive classrooms on their academic achievement. By considering the students’ varying exposure levels, the researcher will be analyzing the data through a production function theory perspective with hopeful insight into possible pedagogical recommendations while also considering moral and ethical implications.

Summary

The literature review in Chapter II provided a historical and chronological examination of the legal, ethical, and learning processes that influence and/or impact inclusionary practices. Inconsistencies and mixed-results are apparent from the empirical evidence provided. Much of the inclusionary research is in reference to the impact of inclusion on the social-emotional and/or academic growth of special education students; the literature review focused on objective research that focused on the impact of inclusion on non-identified general education students. The present study attempts to add to the extensive body of research on the objective academic growth of non-identified general education students’ math performance in inclusive settings. The results will provide
support and/or question the benefits of the in-class support model for non-identified students and provide data to inform policy and practice for educators, administrators, and legislators in meeting the needs of all students. Chapter III will provide a description of the research design, subjects, instrumentation, internal and external validity, methods of data collection and analyses, and the hypotheses tested.
CHAPTER III

METHODOLOGY

Overview

Chapter III includes the following sections: design, research questions, participants, instrumentation, internal and external validity, methods of data collection, and overall analyses. The purpose for this one-district case study was to explain the influence of student exposure to inclusive school environments (in-class support, general education basic skills instruction) and co-teaching (special education) on mathematics achievement of general education elementary students as measured by adaptive achievement tests (NWEA MAP mathematics) over multi-year periods.

The philosophy and practice of the personnel in the Springfield (pseudonym) School District’s of providing instruction in inclusive environments continues to evolve. By the 2004 school year, the start of formal archival data review, the majority of the student population (general education, special education, and basic skills) was receiving instruction within the general education setting; there was only one identified special education student in a pull-out resource room. All classes were heterogeneous and included students at all levels of the academic spectrum based primarily on three indicators: (NWEA MAP math and reading, NJ ASK math and language arts literacy, and Fountas & Pinnell reading benchmarks). One fifth of the classes (2 out of 10 per grade level) included a special education co-teacher. The majority of the services stipulated in the student’s Individualized Education Plan (I.E.P.) were delivered in the general education setting. Two-fifths of the classes (4 out of 10 per grade level) received additional instructional support in mathematics through the use of an in-class support
teacher of basic skills math. Identified basic skills students received further differentiated instruction and personal attention in order to reinforce, review, and refine their mathematical knowledge in the general education classroom. Yearly breakdowns of the class configurations by year are included in Appendix E.

Whether identified as special education or basic skills, the push-in model provided for increased student-teacher contact time, intensity, and specificity of instruction. It is conjectured that these benefits are conveyed to the general education students within these rooms and can be demonstrated by their academic performance on the NWEA MAP math assessments. The results of this one-district case study may provide education administrators with additional objective data through an empirical study to make further recommendations for research, policy, and informed practice.

**Research Design**

A non-experimental correlational, cross-sectional, explanatory design with quantitative methods (Johnson, 2001) was used in the present study. Research can be categorized into two areas: experimental and non-experimental. “In experimental research, a researcher manipulates one or more independent variables to observe the effect of one or more dependent variables . . . . In non-experimental research, the researcher usually observes relationships between two or more variables as they exist, without trying to manipulate them” (Slavin, 1984, pp. 13-14). A correlational design was used to investigate the relationship between the amount of exposure to inclusive classroom environments and student achievement on MAP math assessment. “Correlations are statistics that are used to assess the association or relationship between two variables” (Leech, Barrett, & Morgan, 2011, p. 282). Correlational research includes
only quantitative data (Johnson, 2001). The present study design examined a number of variables that may be related to student achievement.

The relationship between the independent variables was reviewed in order to determine the interaction between and among the independent and dependent variables. Predictor variables that are not highly related to the criterion variable or are redundant were removed from the simultaneous regression analysis. Those variables not found to be statistically significantly related to student achievement were excluded, whereas those variables found to be related to student achievement were further examined to identify the nature of the relationship (Gay, Mills, & Airsian, 2012). Those variables found to be statistically significantly correlated to student achievement did not determine or imply causation but may have provided further insight into the relationship between the independent (exposure) and dependent (student achievement) variables.

Archival data were used to examine the influence of inclusion upon student achievement. The data were collected at a single point in time; therefore, the present study is classified as cross-sectional. This cross-sectional study examined non-identified general education students that were exposed to inclusive classroom environments contemporaneously; the causal effects are being measured between the pre (Grade 3) and post (Grade 6) school year. The Grade 6 school year is the defined time of data collection. Since the manifestations have already occurred “ex post facto,” inferences were made about the relationships among the independent and dependent variables without any direct intervention (Kerlinger, 1968). “. . . most social scientific and educational research problems do not lend themselves to controlled inquiry of the experimental kind” (Kerlinger, 1968, p. 359).
The primary outcome of the present study was explanatory in nature, which is supported by Johnson’s suggested questions for classification: “(a) Were the researchers trying to develop or test a theory about a phenomenon to explain how and why it operates? (b) Were the researchers trying to explain how the phenomenon operates by identifying the causal factors that produce change in it? If the answer is “yes” (and there is no manipulation), then the term *explanatory nonexperimental research* should be applied” (Johnson, 2001, p.9). A complete data set was collected to provide support for the dose/response relationship and to utilize the appropriate statistical controls (Johnson, 2001) in order to support conclusions regarding the independent and dependent variables of the present study. Using Johnson’s typology, the research design of this study is non-experimental, cross-sectional, and explanatory in nature (Type 8); see Table 1 below.

Table 1

*Types of Research Obtained by Crossing Research Objective and Time Dimension*

<table>
<thead>
<tr>
<th>Research Objective</th>
<th>Time Dimension</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Retrospective</td>
<td>Cross-sectional</td>
<td>Longitudinal</td>
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<tr>
<td>Descriptive</td>
<td>Type 1</td>
<td>Type 2</td>
<td>Type 3</td>
<td></td>
</tr>
<tr>
<td>Predictive</td>
<td>Type 4</td>
<td>Type 5</td>
<td>Type 6</td>
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<tr>
<td>Explanatory</td>
<td>Type 7</td>
<td>Cross-Sectional</td>
<td>Exploratory</td>
<td>Type 8</td>
</tr>
</tbody>
</table>
Research Questions

Although research in regard to the influence of inclusionary classroom and school environments has demonstrated a positive influence on the achievement scores of general education students, the researcher could not assume that similar trends could be found when examining the mathematical achievement for the population of Springfield students; therefore the present researcher conducted an investigation to answer the following questions:

1. What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (years) to inclusionary classes over a three-year period?

2. What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (total minutes per day) to inclusionary classes over a three-year period?

3. What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and exposure to co-teaching (special education) environments within a three-year period?

Springfield District education administrators profess that inclusionary practices are in the best interest of all the students. By examining the relationship between the degrees of exposure over a three-year period, the researcher sought to gain insight into the overall influence of these practices upon general education students. If differences existed between the exposure rates, further recommendations for controlled experimental studies could be made.
Setting and Sample

Springfield Elementary School is located in southern New Jersey and houses students in Grades 4 through 6. The population of the Springfield Elementary School in 2004-05, 2005-06, and 2006-07 was comprised of 639, 682, and 633 students, respectively. The district’s solitary lower-elementary building (pre-kindergarten through third) had a population of 810, 793, and 850 in 2004-05, 2005-06, and 2006-07, respectively (see Table 2 for details). The lower elementary building feeds into Springfield Elementary School. The school (state) had a mobility rate of 14.9% (12.8%), 12.3% (12.3%), and 11.1% (11.9%) in 2003-04, 2004-05, and 2005-06, respectively. Over the years of the study, 5.31%, 6.51%, and 5.46% of the students attending Springfield’s schools qualified for free or reduced-cost lunches.

Starting in 1975, the State of New Jersey developed a ranking system for school district socioeconomic status (SES). Indicators include percent of population with no high school diploma, percent of adults with some college education, occupational status, unemployment rate, percent of individuals in poverty, and median family income. These data are available in the decennial census population. There are eight DFGs ranging from A to J, with A representing the lowest SES group. The Springfield district has a GH District Factor Group rating.

The one-year student sample was comprised of all general education (GE) students who were not classified as special education (SE) or basic skills (BSI) students in fourth, fifth, and sixth grades within the Springfield Elementary School for the 2004-05 to the 2006-07 school years. Although additional cohorts of student data were available for study, these data sets were excluded because of major shifts in mathematics
delivery in Grade 6; after the 2006-07 school year, students that were at-risk or excelling were instructed in homogeneous classrooms (basic skills and inclusion or accelerated). Throughout the duration of the study, the administrators of the Springfield Elementary School did not apply for a special education classroom placement waiver; i.e., the number of special education students assigned to a homeroom did not exceed the New Jersey Department of Education cap of eight students. Identified student (special education and/or basic skills) numbers in the classrooms were consistently below six. Table 3 portrays the number of students participating in the three-year inclusion model study; by including all general education students, the empirical validity of the sample was enhanced. To test the overall model, Green (1991) recommends a minimum size of $50 + 8k$, where $k$ is the number of predictors. With five predictors, a sample size of $50 + 40 = 90$ is recommended. In order to test the individual predictors, Green (1991) suggests a minimum sample size of $104 + k$. In an examination with five predictors, a sample size of $104 + 5 = 109$ is recommended. There are six predictor variables in the most inclusive model, including (1) one year of exposure, (2) two years of exposure, (3) three years of exposure, (4) total minutes of exposure, (5) co-teaching, and (6) Grade 3 MAP scores. This model required $50 + 8(6) = 98$, or a total of 98 cases. The sample size ($n = 118$) in the present study provided enough power to identify an effect size of at least 0.50 at the 95% confidence interval as defined by Field (2009) and referenced in Green (1991).
Table 2

**Springfield School District Student Population**

<table>
<thead>
<tr>
<th>Year</th>
<th>District Enrollment</th>
<th>Lower Elementary</th>
<th>Springfield Elementary</th>
<th>District F &amp; R Status</th>
<th>District F &amp; R %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>1449</td>
<td>810</td>
<td>639</td>
<td>77</td>
<td>5.31</td>
</tr>
<tr>
<td>2005-06</td>
<td>1475</td>
<td>793</td>
<td>682</td>
<td>96</td>
<td>6.51</td>
</tr>
<tr>
<td>2006-07</td>
<td>1483</td>
<td>850</td>
<td>633</td>
<td>81</td>
<td>5.46</td>
</tr>
</tbody>
</table>

Table 3

**Student Sample**

<table>
<thead>
<tr>
<th>Year</th>
<th>Participating (n)</th>
<th>Ineligible (n)</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>118</td>
<td>118</td>
<td>236</td>
</tr>
</tbody>
</table>

**Instrumentation**

This was a correlational, explanatory study that used quantitative methods and archived data. The Northwest Evaluation Association (NWEA) measures of academic progress (MAP) mathematics assessment for the spring of third, fifth, and sixth grade were used to measure student performance. The data were collected ex post facto and were not manipulated or influenced by the researcher in any way. All participants were tested under similar testing conditions and completed the assessment on a laptop or
desktop computer. The general education students took the assessment without accommodations of any kind. All final results were tabulated off site by NWEA.

“...The MAP system measures achievement in reading, language usage, mathematics, general science topics, and science concepts and processes for students in Grades 2 through 12” (MAP Technical Manual, 2011, p. 2). NWEA developed reading and mathematical vertical scales that are described as a reliable assessment tool that addresses temporal stability, parallel forms reliability, and internal consistency. MAP is not a static fixed-form test but rather an adaptive test using item response theory (IRT) (Lord, 1980; Lord & Novick, 1968; Rasch, 1980). The NWEA used a mix between test-retest reliability and parallel forms reliability. The time span of the MAP reliability analyses spread across 7 to 12 months. This is much greater than the typical span of two to three weeks in reliability studies. NWEA also used a second test that “by virtue of its content and structure, differing[ed] only in the difficulty level of its items . . . (MAP) test reliability only dipped slightly below 0.80 twice, both at the grade two level” (Cronin, 2005, p. 1). See Appendix F for the MAP mathematics marginal and test-retest reliability estimates.

Test validity was also of concern to the NWEA. The test varies state-to-state and is aligned to state academic standards. The Measures of Academic Progress (MAP) has been aligned to the New Jersey Core Content Curriculum Standards (NJCCCS). The concurrent test validity scores expressed in the form of Pearson correlation coefficients for several states are included in Appendix G. “...The NWEA is continually evaluating the reliability and validity of the Measures of Academic Performance” (Northwest Evaluation Association [NWEA], 2007). The reliability and the validity of the MAP
assessment are considered to be strong (Grade 6 Spring Math marginal $r = 0.96$; test re-test $r = 0.91$).

**Internal and External Validity**

Through the design of this non-experimental, cross-sectional, explanatory quantitative research study, the researcher attempted to reduce the threats to internal and external validity. The researcher used archival data without random sampling and/or assignments to groups; therefore, causality between the independent and dependent variables cannot be claimed. The following discussion is presented to acknowledge and address concerns of internal and external validity.

**Internal Validity**

Due to the non-experimental design of this cross-sectional one-district case study, there are threats to internal validity. The researcher examined data over a four-year period. Causal inferences were difficult to confirm due to the non-experimental design. Confounding could occur. Changes that were observed in the dependent variable (achievement scores) could have been a result of other factors outside of the examined independent variables (years and total minutes per day). The study included all general education, basic skill, and special education students from the same district and school. The analysis considered only the change in scores for the general education population. The student demographics were similar (e.g., age, SES, race, and gender). By selecting and analyzing the achievement scores of all general education students over the course of the one-district case study, selection bias was decreased. Subject selection and maturation interactions were also mitigated. There was little cause for concern in regard to regressions toward the mean; the researcher did not specifically investigate high or low
outliers. All students with testing accommodations were excluded from the case study. Due to the multi-year period of the study as well as the consistency in experience for the students and the teachers, threats to historical validity were reduced.

The researcher also had to consider natural maturation over the course of the three-year study when discussing the influence of the independent variables. Some of the growth in student achievement may have been a result of natural maturation, not influenced by exposure (time). Although MAP was used twice a year for three years, the researcher captured only the spring scores for analysis. The fact that the same instrument was used to measure growth has little relevance since the MAP assessment varies the type of questions and the sequencing of questions during each assessment period. Threats to “repeated testing” bias were minimal and were controlled for based on the design of MAP by NWEA personnel. All of the students in the study took the same assessment, during the same time periods, and under similar conditions. Using the same instrument, internal validity was strengthened. To minimize the influence of attrition, the researcher included only students who had valid scores from each year of the study; this design feature also helped to reinforce the selection validity. The students and faculty could not have known that a historical analysis would occur in the future.

**External Validity**

Due to the idiosyncratic settings, participants, and conditions of this non-experimental study, there were threats to generalized causal inferences otherwise known as external validity. When defining the subgroups (amount of exposure to inclusive settings), the sample size in the various categories decreased. Small sample size may have created population validity concerns. The setting of the study created ecological
validity concerns. The ability to generalize the findings of this study outside of southern New Jersey DFG-GH schools is limited. Administrators in schools in other states with similar criteria as those used in the New Jersey district factor group classifications may find value in this study.

Although internal and external validity threats do exist in this study, the researcher attempted to control for as many concerns as possible. “Data from correlational and causal-comparative designs provide us with useful pointers for other research that might enable us to draw causal inferences” (Haller & Kleine, 2001, p. 100). Although a relationship may be found, it is important not to overly simplify or judge the directionality of the correlation. Questions of internal and external validity must be considered in the study design in order to further draw conclusions and interpret the results appropriately (Campbell & Stanley, 1963). The researcher considered these threats upon completion of the data analysis and before arriving at any conclusions that are causal in nature.

**Data Collection**

Data for this study were collected by disaggregating historical normative test scores, Northwest Evaluation Association (NWEA) Measures of Academic Performance (MAP) individual student scale scores, for students while attending third, fifth, and sixth grade. Prior to archival data collection, approval was granted from the Chief School Administrator(s) (see Appendix A). Formal Board of Education approval was granted on March 28, 2011 (see Appendix B). Appendix C presents the Institutional Review Board non-review certification. Codes for all participants and variables were assigned prior to data export. Variables included classroom environment (e.g., general education, basic
skills, or special education) in order to determine minutes of daily exposure (e.g., 0, 30, 60, 73, 90, 103, 133, 146, 176 or 219) and years of exposure (e.g., 0, 1, 2, or 3), year of assignment (e.g., 1: 2004-2005, 2: 2005-2006, and 3: 2006-2007), spring MAP RIT values, co-teaching assignments, and SES. The original data were collected, purged of any identifying information to assure student anonymity, and forwarded to the researcher by a third party employee on an external storage device. All future derivations of the data were also stored externally and kept in a locked and secured site. No one except the researcher had access to the storage device(s).

The assessment data were collected from the measure of academic performance assessment in the spring of third (pre-test) and sixth (post-test) grade. Students were assessed either on laptop or desktop computers. All assessments were untimed. If additional time was required, students were permitted to continue in one of the testing locations. Students were assessed on one of the two district required content areas (mathematics or reading) per day. Any students that were not assessed during the three collection times were excluded from the study. Students that were new to the district or left the district prior to the completion of the three-year data collection were also excluded from the study. Students that were formally identified before or during the three year archival data review period in need of basic skills instruction or as special education students were excluded from the study (See Appendix D for basic skills criterion). All assessment results were inputted into the district database after the testing window closed, and all results were updated and returned by NWEA.

The general education students assigned to inclusive classes were identified based upon the classroom configuration (e.g., co-teaching or basic skills support) to determine
exposure rates. A general education student could have no (0), 1 year, 2 years, or 3 years of exposure to inclusive classes. Table 4 provides a summary of the number of students assigned to inclusive classes over the course of the study.

An additional analysis into the amount of contact time (defined as exposure to inclusive environments) that general education students experienced in comparison to their achievement scores. For example, a general education student assigned to a classroom without support, with a basic skills instructor or a co-teacher, would accumulate the following amount of possible contact time: 0, 30, or 73 minutes daily. Students assigned to a co-teaching classroom had additional teacher support for 73 minutes on a daily basis; ten 44-minute periods within a six-day cycle equate to 73 minutes of daily contact time. Basic skills teachers support each classroom to which they are assigned for 30 minutes daily. At the end of the three year data review period, general education students could have the following final breakdowns of contact time – 0, 30, 60, 73, 90, 103, 133, 146, 176, or 219 total minutes per day. Table 4 provides a summary of the number of students over the course of the study identified for each of the possible exposure rates.

The final analysis investigated the impact of being assigned to a co-teaching (special education) setting for any period over the three years of study. Students exposed to co-teaching environments based on these parameters were coded as 1 (yes).
Table 4

*Inclusion Model General Education Student Accumulated Yearly Exposure Rates*

<table>
<thead>
<tr>
<th>Year</th>
<th>0 Years</th>
<th>1 Year</th>
<th>2 Years</th>
<th>3 Years</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>19</td>
<td>50</td>
<td>38</td>
<td>11</td>
<td>119</td>
</tr>
</tbody>
</table>

Table 5

*Inclusion Model General Education Student Cumulative Exposure Rates*

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>30</th>
<th>60</th>
<th>88</th>
<th>90</th>
<th>118</th>
<th>148</th>
<th>176</th>
<th>206</th>
<th>264</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>19</td>
<td>30</td>
<td>11</td>
<td>20</td>
<td>4</td>
<td>22</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>118</td>
</tr>
</tbody>
</table>

**Data Analysis**

Correlational non-experimental (Kerlinger, 1968) cross-sectional, explanatory research (Johnson, 2001) was conducted. The student data that were being collected, disaggregated, and compared were not manipulated by the researcher. The data were collected and analyzed after all students had been placed into classes, instructed, and assessed. The researcher examined historical data from the results of the Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) for students in third and sixth grade. The dependent variable in all analyses was the culminating spring MAP RIT scores in mathematics. The independent variable(s) varied based on the questions posed; e.g., exposure by year and exposure by total minutes per day. After
reviewing the characteristics of the available data, one year (2006-07) of culminating data was selected for study; see limitations and delimitations for further clarification on subject selection. The statistical analyses of the data were completed using the Statistics Package for the Social Sciences (SPSS), Version 14.0.

The data were disaggregated by groups and tested using simultaneous regression analyses. Prior to running the correlational analyses, descriptive statistics were conducted for the dependent variable (Grade 6 Spring MAP scores). This analysis presented the main features of the data (e.g., measures of central tendency, variance, and standard deviation) and checked for normality of the population. The skewness level of -.191 suggested an acceptable amount of normality with the dependent variable. Simultaneous regression analyses were completed since no basis of hierarchy was measured prior to running the analysis; all variables were considered on an equal footing (Cohen and Cohen, 1983). The level of significance for the comparative analyses was set at a significance level of $p \leq .05$. The data were analyzed to determine the influence that exposure to inclusion classes had on general education students’ mathematics performance as measured by MAP. Five models were run prior to determining the model of best fit (see Table 6).

The initial simultaneous regression analysis included all independent variables; one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, co-teaching environments, and Grade 3 spring MAP results and did not control for socioeconomic status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination ($R^2$), and collinearity statistics were examined for significance.
The initial review was followed by a simultaneous regression analysis excluding the variable total minutes of exposure. The analysis included the following independent variables: one year of exposure, two years of exposure, three years of exposure, co-teaching environments, and Grade 3 Spring MAP results and did not control for socioeconomic status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination \( (R^2) \), and collinearity statistics were examined for significance.

An additional simultaneous regression analysis excluding the variable co-teaching was conducted. The analysis included the following independent variables: one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and Grade 3 Spring MAP results and did not control for socioeconomic status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination \( (R^2) \), and collinearity statistics were examined for significance.

The next simultaneous regression analysis controlled for socioeconomic status and excluded the variable co-teaching. The analysis included the following independent variables: one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, Grade 3 Spring MAP results, and socioeconomic status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination \( (R^2) \), and collinearity statistics were examined for significance.

The penultimate simultaneous regression analysis controlled for socioeconomic status and excluded the variable total minutes of exposure. The analysis included the following independent variables: one year of exposure, two years of exposure, three years of exposure, co-teaching environment, Grade 3 Spring MAP results, and socioeconomic status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination \( (R^2) \), and collinearity statistics were examined for significance.
status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination ($R^2$), and collinearity statistics were examined for significance.

The final simultaneous regression analysis and model of best fit controlled for socioeconomic status and excluded the variables (a) two years of exposure and (b) total minutes of exposure. Two years of exposure mimicked one year of exposure and did not strengthen the model(s), and total minutes of exposure did not significantly strengthen models 1, 4, or 5. The analysis included the following independent variables; one year of exposure, three years of exposure, co-teaching environment, Grade 3 Spring MAP results, and socioeconomic status; descriptive statistics were reviewed and analysis of variance (ANOVA), coefficient of determination ($R^2$), and collinearity statistics were examined for significance. There was no multicollinearity in the model of best fit.

Table 6

*Progression of Simultaneous Regression Analyses*

<table>
<thead>
<tr>
<th></th>
<th>Initial Data Review</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5 Model of Best Fit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Year of Exposure</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>2 Years of Exposure</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td><strong>Excluded</strong></td>
</tr>
<tr>
<td>3 Years of Exposure</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Total Min Exposure</td>
<td>Included</td>
<td><strong>Excluded</strong></td>
<td>Included</td>
<td>Included</td>
<td><strong>Excluded</strong></td>
<td><strong>Excluded</strong></td>
</tr>
<tr>
<td>Co-Teaching</td>
<td>Included</td>
<td>Included</td>
<td><strong>Excluded</strong></td>
<td><strong>Excluded</strong></td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Grade 3 Scores</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>SES</td>
<td><strong>Excluded</strong></td>
<td><strong>Excluded</strong></td>
<td><strong>Excluded</strong></td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
</tbody>
</table>
Summary

Springfield School District education administrators had a motivation in finding the outcomes of this study. The education administrators were hopeful that the study would provide statistical support for the current inclusionary practices throughout the grade levels. Chapter III provided a description of the research design, subjects, instrumentation, internal and external validity, methods of data collection and analyses, and the hypotheses tested. Details were also provided for the inclusionary model and program delivery for the upper-elementary school in Springfield. The program delivery includes special education (co-teaching) and basic skills instruction (push-in) in an in-class support model (inclusion). Chapter IV presents the collected data and the quantitative analyses. Tables and figures are presented to summarize the results.
CHAPTER IV

ANALYSIS OF THE DATA

Introduction

The purpose for this one-district case study was to explain the influence of student exposure to inclusive school environments (in-class support, general education basic skills instruction) and co-teaching (special education) on mathematics achievement of general education elementary students as measured by adaptive achievement tests (NWEA MAP mathematics) over multi-year periods. The archival ex post facto data analyzed included years of exposure (1, 2, or 3), daily minutes of exposure, and exposure to co-teaching classrooms. Three of the five models, including the model of best fit, controlled for socioeconomic status (free and reduced-cost lunch). The results of this study may offer education administrators and policy makers data to create in-class support policy, efficiently use resources (staffing), and alter the configurations of schools in order to increase student achievement.

Descriptive Statistics

The available archival data were collected at a single-point in time and were ex post facto. Table 7 provides descriptive statistics for the dependent variable, MAP math RIT score Grade 6, and a check for skewness. The results suggest a small negative skew but within acceptable limits of ± 1.000.
Table 7

Descriptive Statics – Dependent Variable

<table>
<thead>
<tr>
<th>Descriptives</th>
<th>Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring MAP Math RIT Score Gr. 6</td>
<td>Mean</td>
<td>240.35</td>
</tr>
<tr>
<td></td>
<td>95% Confidence Interval for Mean</td>
<td>Lower Bound 238.83, Upper Bound 241.86</td>
</tr>
<tr>
<td></td>
<td>5% Trimmed Mean</td>
<td>240.46</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>241.00</td>
</tr>
<tr>
<td></td>
<td>Variance</td>
<td>68.827</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>8.296</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>218</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Interquartile Range</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Skewness</td>
<td>-.191</td>
</tr>
<tr>
<td></td>
<td>Kurtosis</td>
<td>-.050</td>
</tr>
</tbody>
</table>

The descriptive analysis of the dependent variable, spring MAP math RIT score Grade 6, explored the normality of the data. The average student RIT score in the spring of Grade 6 was 240.35 ± 8.296 with a minimum score of 218 and a maximum of 260. The analysis presented a normal bell curve with limited (-.191) skewness. The population sample represented a normal sample. Table 8 provides the descriptive profile for all variables.
Table 8

Descriptive Statistics – All Variables

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring MAP Math RIT Score Gr. 6</td>
<td>118</td>
<td>218</td>
<td>260</td>
<td>240.35</td>
<td>8.296</td>
</tr>
<tr>
<td>Spring MAP Math RIT Score Gr. 3</td>
<td>118</td>
<td>199</td>
<td>236</td>
<td>215.00</td>
<td>8.199</td>
</tr>
<tr>
<td>One Year of Exposure</td>
<td>118</td>
<td>N/A</td>
<td>N/A</td>
<td>.42</td>
<td>.496</td>
</tr>
<tr>
<td>Two Years of Exposure</td>
<td>118</td>
<td>N/A</td>
<td>N/A</td>
<td>.32</td>
<td>.469</td>
</tr>
<tr>
<td>Three Years of Exposure</td>
<td>118</td>
<td>N/A</td>
<td>N/A</td>
<td>.09</td>
<td>.292</td>
</tr>
<tr>
<td>Total Minutes of Exposure</td>
<td>118</td>
<td>.0</td>
<td>264</td>
<td>72.37</td>
<td>57.513</td>
</tr>
<tr>
<td>Co-teaching (SE)</td>
<td>118</td>
<td>N/A</td>
<td>N/A</td>
<td>.45</td>
<td>0.500</td>
</tr>
<tr>
<td>Free/Reduced</td>
<td>118</td>
<td>N/A</td>
<td>N/A</td>
<td>.03</td>
<td>.182</td>
</tr>
</tbody>
</table>

The descriptive statistics provide an overall view of the data. The mean student score on the MAP assessment in Grade 3 was 215.00 ± 8.199 with a minimum score of 199 and a maximum of 236. At the close of the three-year period, the mean score of the students on the MAP assessment in Grade 6 was 240.35 ± 8.296 with a minimum score of 218 and a maximum of 260. The percent of students exposed to inclusive classroom environments (basic skills and/or co-teaching) for one, two, and three years was 42%, 32%, and 9%, respectively. The percent of students exposed to co-teaching classroom environments over the course of the three-year analysis was 45%. Three percent (n = 4) of the tested population sample received free or reduced-cost lunch.
Research Questions

The study was guided by the central research question: To what extent does exposure to inclusive classroom environments over multi-year periods influence the mathematics achievement of general education students when controlling for student variables?

Research Question 1: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (years) to inclusionary classes over a three-year period?

Research Question 2: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (total minutes per day) to inclusionary classes over a three-year period?

Research Question 3: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and exposure to co-teaching (special education) environments within a three-year period?

Hypotheses

H$_{01}$: There is no statistically significant relationship between the mathematics scores of general education sixth grade students as measured by the NWEA MAP assessment and the amount of time exposed (years) to inclusionary classes over a three-year period.

H$_{02}$: There is no statistically significant difference between the achievement scores of general education sixth grade students as measured by the NWEA MAP assessment and the amount of time exposed (total minutes per day) to inclusionary classes over a three-year period.
**H₀³**: There is no statistically significant relationship between the mathematics scores of general education sixth grade students as measured by the NWEA MAP assessment and time exposed to co-teaching (special education) classroom environments.

**Results**

After reviewing the normality of the dependent variable, a correlation matrix was completed in order to analyze the relationship between variables (see Table 9). The correlation coefficient values are between -1 and +1, which represent a correlated positive or negative relationship, respectively. The Pearson Correlation table illustrates the statistically significant ($p = .000 < .05$) strong positive relationship ($r = 0.677$) between the predictor variable spring MAP math RIT score Grade 4 and the dependent variable spring MAP math RIT score Grade 6.

The Pearson Correlation table also indicates statistically significant relationships between several of the predictor variables. There is a strong negative relationship between the predictor variables of one year of exposure and two years of exposure ($r = -0.591; p \leq .000$). There is a strong negative relationship between the predictor variables of one year of exposure and three years of exposure ($r = -.275; p = .001 < .05$). There is a strong negative relationship between the predictor variables of one year of exposure and total minutes of exposure ($r = -.287; p = .001 < .05$). There is a strong negative relationship between the predictor variables of two years of exposure and three years of exposure ($r = -.221; p = .008 < .05$). There is a strong positive relationship between the predictor variables of two years of exposure and total minutes of exposure ($r = .439; p = .000 < .05$). There is a strong positive
relationship between the predictor variables of three years of exposure and total minutes of exposure ($r = .482; p \leq .000$). There is a strong positive relationship between the predictor variables of total minutes of exposure and co-teaching ($r = .793; p = .000 < .05$). There is a strong negative relationship between the predictor variables of total minutes of exposure and free or reduced-cost lunch ($r = -.165; p = .037 < .05$).

Table 9

Correlation Table

<table>
<thead>
<tr>
<th></th>
<th>Spring MAP Math RIT Gr. 6</th>
<th>Spring MAP Math RIT Gr. 4</th>
<th>One Year of Exposure</th>
<th>Two Years of Exposure</th>
<th>Three Years of Exposure</th>
<th>Total Minutes of Exposure</th>
<th>Co-teaching (SE)</th>
<th>Free/Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (1-tailed)</td>
<td></td>
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<td></td>
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<tr>
<td>N</td>
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<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Simultaneous Regression Analysis

The initial review of the data presented a normal bell curve; therefore, the researcher conducted several multiple regression analyses to determine the model of best fit. Multiple regression analysis is the preferred analysis for making predictions using
several independent variables (Morgan, Leech, Gloeckner, & Barrett, 2013). There was no basis of hierarchy measured; all variables were on equal footing (Cohen & Cohen, 1983). The initial model excluding socioeconomic status and the five preceding simultaneous regression analyses are presented sequentially in the order conducted.

**Initial Model**

An initial regression analysis provided a first look at the relationship between the dependent and independent variables. The model summary table in the initial simultaneous regression analysis presented the multiple correlation coefficient $R(0.696)$ and the $R^2(.484)$ for the complete model. Approximately 48% of the variance in the spring MAP math RIT score in Grade 6 can be predicted from the combination of one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, co-teaching, and spring MAP math RIT scores in Grade 3 (see Tables 10 and 11). The initial model did not control for socioeconomic status.

**Table 10**

*Initial Model: Variables Entered/Removed*

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure, Co-teaching (SE)</td>
<td>Enter</td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. All requested variables entered.
Table 11

*Initial Model: Model Summary for All Variables*

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adjusted $R$ Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Sig. $F$ Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$R$ Square Change</td>
<td>$F$ Change</td>
</tr>
<tr>
<td>I</td>
<td>.696$^a$</td>
<td>.484</td>
<td>.457</td>
<td>6.116</td>
<td>.484</td>
<td>17.384</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure, Co-teaching (SE)

The model summary and ANOVA table (see Table 12) presents the statistically significant ($p = .000 < .05$) $F$ change value ($F = 17.384$). The model summary indicates that the combined independent variables significantly predict the spring MAP math RIT scores in Grade 6. The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and co-teaching) to predict Grade 6 MAP scores was statistically significant, $F$ (6, 111) = 17.384, $p = .000 < .05$.

Table 12

*Initial Model: ANOVA Table of the Variables*

<table>
<thead>
<tr>
<th>ANOVA$^a$</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Sum of Squares</td>
<td>df</td>
<td>Mean Square</td>
<td>$F$</td>
<td>Sig.</td>
</tr>
<tr>
<td>I Regression</td>
<td>3901.153</td>
<td>6</td>
<td>650.192</td>
<td>17.384</td>
<td>.000$^b$</td>
</tr>
<tr>
<td>Residual</td>
<td>4151.601</td>
<td>111</td>
<td>37.402</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8052.754</td>
<td>117</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure, Co-teaching (SE)

The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and co-teaching) was statistically significant ($p = .000 < .05$). The beta coefficients are
presented in Table 13. In the initial model, only spring MAP math RIT Grade 3 was found to be statistically significant ($\beta = 0.701, t = 10.131, p = .000 < .05$). The initial model found a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The relationship between students’ previous scores and their future scores appear to have a natural connection. The analysis of variance inflation factor (VIF) for spring MAP math RIT Grade 3 was 1.030. “The variance-inflation factor is a useful diagnostic because it directly indicates the harm inflicted by collinearity” (Fox & Monett, 1992, p. 178). According to Morrow-Howell (1994), multicollinearity exists when independent/predictor variables are highly correlated. All of the independent/predictor variables in Model 1 except MAP math RIT Grade 3 were well over 2, indicating a multicollinearity issue. Total minutes of exposure had the highest VIF (10.186) and were excluded from Model 1 in order to eliminate redundancy.

Table 13

*Initial Model: Coefficient Table with VIF Scores*

<table>
<thead>
<tr>
<th>Coefficientsa</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>I (Constant)</td>
<td>88.813</td>
<td>15.051</td>
<td>5.901</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>One Year of Exposure</td>
<td>-1.176</td>
<td>1.922</td>
<td>-.070</td>
<td>-612</td>
<td>.542</td>
</tr>
<tr>
<td>Two Years of Exposure</td>
<td>-4.098</td>
<td>2.791</td>
<td>-.232</td>
<td>-1.468</td>
<td>.145</td>
</tr>
<tr>
<td>Three Years of Exposure</td>
<td>-5.241</td>
<td>4.401</td>
<td>-.184</td>
<td>-1.191</td>
<td>.236</td>
</tr>
<tr>
<td>Total Minutes of Exposure</td>
<td>.048</td>
<td>.031</td>
<td>.336</td>
<td>1.543</td>
<td>.126</td>
</tr>
<tr>
<td>Co-teaching (SE)</td>
<td>-4.710</td>
<td>2.436</td>
<td>-.284</td>
<td>-1.934</td>
<td>.056</td>
</tr>
<tr>
<td>Spring MAP Math RIT Gr. 3</td>
<td>.709</td>
<td>.070</td>
<td>.701</td>
<td>10.131</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
Model 1

The model summary table for the first simultaneous regression analysis presented the multiple correlation coefficient $R$ (0.688) and the $R^2$ (.473). Approximately 47% of the variance in the spring MAP math RIT score in grade 6 can be predicted from the combination of one year of exposure, two years of exposure, three years of exposure, co-teaching, and spring MAP math RIT scores in Grade 3 (see Tables 14 and 15). The first model excluded total minutes of exposure and did not control for socioeconomic status.

Table 14

Model 1: Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Co-teaching (SE)</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. All requested variables entered.

table 15

Model 1: Model Summary for All Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adjusted $R$ Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$R$ Square Change</td>
</tr>
<tr>
<td>1</td>
<td>.688*</td>
<td>.473</td>
<td>.450</td>
<td>6.153</td>
<td>.473</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Co-teaching (SE)

The model summary and ANOVA table (see Table 16) presents the statistically significant ($p < .000$) $F$ change value ($F = 20.136$). This indicates that the combined
independent variables significantly predict the spring MAP math RIT scores in Grade 6. The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, and co-teaching) to predict Grade 6 MAP scores was statistically significant, $F (5, 112) = 20.136, p = .000 < .05$.

Table 16

**Model 1: ANOVA Table of the Variables**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>3812.111</td>
<td>5</td>
<td>762.422</td>
<td>20.136</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>4240.643</td>
<td>112</td>
<td>37.863</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8052.754</td>
<td>117</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Co-teaching (SE)

The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, and co-teaching) was statistically significant ($p = .000 < .05$). The beta coefficients are presented in Table 17. In the first model, only spring MAP math RIT Grade 3 was found to be statistically significant ($\beta = 0.692$, $t = 9.979$, $p = .000 < .05$). The first model found a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The relationship between students’ previous scores and their future scores remained. The model continued to support a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores.

The analysis of variance inflation factor (VIF) for spring MAP math RIT Grade 3 was 1.024. The VIF factor for three years of exposure and co-teaching (SE) both fell below two (2), 1.614 and 1.285, respectively. The VIF for one year of exposure and two years of exposure approached two (2), 2.296 and 2.576, respectively. To explore the
relationship between the dependent and independent variables, the second model excluded co-teaching (SE) in order to focus on the impact of time (years or total minutes of exposure).

Table 17

Model 1: Coefficient Table with VIF Scores

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>t</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>90.626</td>
<td>15.098</td>
</tr>
<tr>
<td></td>
<td>One Year of Exposure</td>
<td>-.126</td>
<td>1.737</td>
</tr>
<tr>
<td></td>
<td>Two Years of Exposure</td>
<td>-.993</td>
<td>1.946</td>
</tr>
<tr>
<td></td>
<td>Three Years of Exposure</td>
<td>.389</td>
<td>2.475</td>
</tr>
<tr>
<td></td>
<td>Co-teaching (SE)</td>
<td>-.1516</td>
<td>1.291</td>
</tr>
<tr>
<td></td>
<td>Spring MAP Math RIT Gr. 3</td>
<td>.701</td>
<td>.070</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6

Model 2

The model summary table in the second simultaneous regression analysis presented the multiple correlation coefficient $R$ (0.683) and the $R^2$ (.467). Approximately 47% of the variance in the spring MAP math RIT score in Grade 6 can be predicted from the combination of one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and spring MAP math RIT scores in Grade 3 (see Tables 18 and 19). The second model excluded co-teaching and did not control for socioeconomic status.
Table 18

**Model 2: Variables Entered/Removed**

<table>
<thead>
<tr>
<th>Model</th>
<th>VariablesEntered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6  
b. All requested variables entered.

Table 19

**Model 2: Model Summary for All Variables**

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adjusted $R$ Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$R$ Square Change</td>
</tr>
<tr>
<td>2</td>
<td>.683$^a$</td>
<td>.467</td>
<td>.443</td>
<td>6.190</td>
<td>.467</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure

The model summary and ANOVA table (see Table 20) presents the statistically significant ($p = .000 < .05$) $F$ change value ($F = 19.633$). The combined independent variables significantly predicted the spring MAP math RIT scores in Grade 6. The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, and total minutes of exposure) to predict Grade 6 MAP scores were statistically significant, $F (5, 112) = 19.633$, $p = .000 < .05$.)
Table 20

**Model 2: ANOVA Table of the Variables**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3812.111</td>
<td>5</td>
<td>762.422</td>
<td>20.136</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>4240.643</td>
<td>112</td>
<td>37.863</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8052.754</td>
<td>117</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure

The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, and total minutes of exposure) was statistically significant ($p = .000 < .05$). The beta coefficients are presented in Table 21. In the first model, only spring MAP math RIT Grade 3 was found to be statistically significant ($\beta = 0.689, t = 9.878, p = .000 < .05$). The second model found a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The relationship between students’ previous scores and their future scores remained. The model continued to support a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores.

The analysis of variance inflation factor (VIF) for spring MAP Math RIT Grade 3 was 1.022. All other VIF factors as compared to the first model but were below the values of the initial value (one year of exposure = 2.690; two years of exposure = 4.285; three years of exposure = 3.265; total minutes of exposure = 2.827). In order to further explore the relationship between the dependent and independent variables, the third model controlled for socioeconomic status and excluded co-teaching (SE) in order focus on the impact of time (years or total minutes of exposure).
Table 21

Model 2: Coefficient Table with VIF Scores

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized</td>
<td>Beta</td>
<td>t</td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>91.411</td>
<td>15.174</td>
</tr>
<tr>
<td></td>
<td>One Year of Exposure</td>
<td>-.310</td>
<td>1.891</td>
</tr>
<tr>
<td></td>
<td>Two Years of Exposure</td>
<td>-1.678</td>
<td>2.525</td>
</tr>
<tr>
<td></td>
<td>Three Years of Exposure</td>
<td>-.079</td>
<td>3.542</td>
</tr>
<tr>
<td></td>
<td>Total Minutes of Exposure</td>
<td>-.003</td>
<td>.017</td>
</tr>
<tr>
<td></td>
<td>Spring MAP Math RIT Gr. 3</td>
<td>.697</td>
<td>.071</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6

Model 3

The model summary table for the third simultaneous regression analysis presented the multiple correlation coefficient $R$ (0.687) and the $R^2$ (.472). Approximately 47% of the variance in the spring MAP math RIT score in Grade 6 can be predicted from the combination of one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and spring MAP math RIT scores in Grade 3 (see Tables 22 and 23). The third model excluded co-teaching and controlled for socioeconomic status.

Table 22

Model 3: Variables Entered/ Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure, Free/Reduced b</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. All requested variables entered.
Table 23

Model 3: Model Summary for All Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Adjusted $R$ Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$R$ Square Change</td>
</tr>
<tr>
<td>3</td>
<td>.687*</td>
<td>.472</td>
<td>.444</td>
<td>6.188</td>
<td>.472</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure, Free/Reduced

The model summary and ANOVA table (see Table 24) presents the statistically significant ($p = .000 < .05$) $F$ change value ($F = 16.550$). The combined independent variables significantly predict the spring MAP math RIT scores in Grade 6. The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and free or reduced-cost lunch) to predict Grade 6 MAP scores was statistically significant, $F(6, 111) = 16.550, p = .000 < .05$.

Table 24

Model 3: ANOVA Table of the Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>$df$</th>
<th>Mean Square</th>
<th>$F$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Regression</td>
<td>3802.322</td>
<td>6</td>
<td>633.720</td>
<td>16.550</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>4250.432</td>
<td>111</td>
<td>38.292</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8052.754</td>
<td>117</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Total Minutes of Exposure, Free/Reduced

The combination of the variables (MAP Math RIT Score Grade 3, one year of exposure, two years of exposure, three years of exposure, total minutes of exposure, and
free/reduced-cost lunch) was statistically significant \((p = .000 < .05)\). The beta coefficients are presented in Table 25. In the third model, only spring MAP Math RIT Grade 3 was found to be statistically significant \((β = 0.697, t = 9.934, p = .000 < .05)\).

The third model found a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores.

The relationship between students’ previous scores and their future scores remained. The model continued to support a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The analysis of variance inflation factor (VIF) for spring MAP Math RIT Grade 3 was 1.022. All other VIF factors increased slightly when compared to the second model but were below the values of the initial value (one year of exposure = 2.878; two years of exposure = 4.525; three years of exposure = 3.382; total minutes of exposure = 2.834). Free/reduced-cost lunch had a VIF value of 1.120. To explore the relationship between the dependent and independent variables, the fourth model controlled for socioeconomic status and excluded total minutes of exposure. The VIF values of the first model were the lowest overall and excluded total minutes of exposure.
Table 25

Model 3: Coefficient Table with VIF Scores

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>3</td>
<td>(Constant)</td>
<td>89.049</td>
<td>15.339</td>
</tr>
<tr>
<td></td>
<td>One Year of Exposure</td>
<td>.207</td>
<td>1.956</td>
</tr>
<tr>
<td></td>
<td>Two Years of Exposure</td>
<td>-1.059</td>
<td>2.594</td>
</tr>
<tr>
<td></td>
<td>Three Years of Exposure</td>
<td>.615</td>
<td>3.604</td>
</tr>
<tr>
<td></td>
<td>Total Minutes of Exposure</td>
<td>-.004</td>
<td>.017</td>
</tr>
<tr>
<td></td>
<td>Spring MAP Math RIT Gr. 3</td>
<td>.705</td>
<td>.071</td>
</tr>
<tr>
<td></td>
<td>Free/Reduced</td>
<td>3.449</td>
<td>3.331</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6

Model 4

The model summary table for the fourth simultaneous regression analysis presented the multiple correlation coefficient $R$ (0.692) and the $R^2$ (.479). Approximately 48% of the variance in the spring MAP math RIT score in Grade 6 can be predicted from the combination of one year of exposure, two years of exposure, three years of exposure, spring MAP math RIT scores in Grade 3, co-teaching, and free or reduced-cost lunch (see Tables 26 and 27). The fourth model excluded total minutes of exposure and controlled for socioeconomic status.
Table 26

Model 4: Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Co-teaching, Free/Reduced</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. All requested variables entered.

Table 27

Model 4: Model Summary for All Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>.692$^a$</td>
<td>.479</td>
<td>.451</td>
<td>6.146</td>
<td>.479</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure, Three Years of Exposure, Co-teaching, Free/Reduced

The model summary and ANOVA table (see Table 28) presents the statistically significant ($p = .000 < .05$) $F$ change value ($F = 17.027$). The combined independent variables significantly predict the spring MAP math RIT scores in Grade 6. The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, co-teaching, and free or reduced-cost lunch) to predict Grade 6 MAP scores was statistically significant, $F(6, 111) = 17.027, p = .000 < .05$.)
Table 28

*Model 4: ANOVA Table of the Variables*

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Regression</td>
<td>3802.322</td>
<td>6</td>
<td>643.249</td>
<td>17.027</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>4250.432</td>
<td>111</td>
<td>37.777</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8052.754</td>
<td>117</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Two Years of Exposure , Three Years of Exposure, Co-teaching, Free/Reduced

The combination of the variables (MAP math RIT score Grade 3, one year of exposure, two years of exposure, three years of exposure, co-teaching, and free or reduced-cost lunch) was statistically significant ($p = .000 < .05$). The beta coefficients are presented in Table 29. In the fourth model, only spring MAP math RIT Grade 3 was found to be statistically significant ($\beta = 0.702, t = 10.053, p = .000 < .05$). The fourth model found a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The relationship between students’ previous scores and their future scores remained.

The model continued to support a statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The analysis of variance inflation factor (VIF) for spring MAP math RIT Grade 3 was 1.039. Three years of exposure (1.707), co-teaching (1.292), and free or reduced-cost lunch (1.123) had VIFs below 2.0. The remaining independent variables approached 2.0 (one year of exposure = 2.479; two years of exposure = 2.796). To further explore the relationship between the dependent and independent variables, the fifth and final model controlled for socioeconomic status and excluded total minutes of exposure and two years of exposure. One year and two
years of exposure performed identically throughout the analyses and the VIF values of the first model were the lowest overall and excluded total minutes of exposure.

Table 29

**Model 4: Coefficient Table with VIF Scores**

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized</td>
<td>Beta</td>
<td>t</td>
</tr>
<tr>
<td>4</td>
<td>(Constant)</td>
<td>88.027</td>
<td>15.258</td>
</tr>
<tr>
<td></td>
<td>One Year of Exposure</td>
<td>.675</td>
<td>1.803</td>
</tr>
<tr>
<td></td>
<td>Two Years of Exposure</td>
<td>-.358</td>
<td>2.025</td>
</tr>
<tr>
<td></td>
<td>Three Years of Exposure</td>
<td>1.055</td>
<td>2.543</td>
</tr>
<tr>
<td></td>
<td>Co-teaching</td>
<td>-1.621</td>
<td>1.293</td>
</tr>
<tr>
<td></td>
<td>Spring MAP Math RIT Gr. 3</td>
<td>.710</td>
<td>.071</td>
</tr>
<tr>
<td></td>
<td>Free/Reduced</td>
<td>3.711</td>
<td>3.313</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6

**Model of Best Fit**

The model summary table for the fifth and final simultaneous regression analysis presented the multiple correlation coefficient $R (0.692)$ and the $R^2 (.479)$. Approximately 48% of the variance in the spring MAP math RIT score in Grade 6 can be predicted from the combination of one year of exposure, three years of exposure, spring MAP math RIT scores in Grade 3, co-teaching, and free or reduced-cost lunch (see Tables 30 and 31).

The fourth model excluded two years of exposure and total minutes of exposure and controlled for socioeconomic status.
Table 30

Model 5: Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Three Years of Exposure, Co-teaching, Free/Reduced</td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. All requested variables entered.

Table 31

Model 5: Model Summary for All Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R Square Change</td>
<td>F Change</td>
</tr>
<tr>
<td>5</td>
<td>.692</td>
<td>.479</td>
<td>.456</td>
<td>6.120</td>
<td>.479</td>
<td>20.605</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Three Years of Exposure, Co-teaching, Free/Reduced

The model summary and ANOVA table (see Table 32) presents the statistically significant ($p = .000 < .05$) $F$ change value ($F = 20.605$). The combined independent variables significantly predict the spring MAP math RIT scores in Grade 6. The combination of the variables (MAP math RIT score Grade 3, one year of exposure, three years of exposure, co-teaching, and free or reduced-cost lunch) to predict Grade 6 MAP scores was statistically significant, $F(5, 112) = 20.605, p = .000 < .05$.)
Table 32

Model 5: ANOVA Table of the Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>ANOVA Table of the Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum of Squares</td>
</tr>
<tr>
<td>5</td>
<td>Regression</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6
b. Predictors: (Constant), Spring MAP Math RIT Score Gr. 3, One Year of Exposure, Three Years of Exposure, Co-teaching, Free/Reduced

The combination of the variables (MAP math RIT score Grade 3, one year of exposure, three years of exposure, co-teaching, and free or reduced-cost lunch) was statistically significant ($p = .000 < .05$). The beta coefficients are presented in Table 33.

In the fifth model, only spring MAP math RIT Grade 3 was found to be statistically significant ($\beta = 0.701, t = 10.096, p = .000 < .05$). The fifth model supported the statistically significant relationship between the students’ Grade 3 and Grade 6 MAP scores. The relationship between students’ previous scores and their future scores remained.

The analysis of variance inflation factor (VIF) for spring MAP math RIT Grade 3 was 1.038. Within the model of best fit, all VIFs fell below 2.0 (one year of exposure = 1.099; three years of exposure (1.116), co-teaching (1.029), and free or reduced-cost lunch (1.035). By excluding two years of exposure (redundancy with one year of exposure) and total minutes of exposure and controlling for socioeconomic status, the fifth and final model had the lowest VIFs and strongest collinearity.
Table 33

Model 5: Coefficient Table with VIF Scores

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>(Constant)</td>
<td>87.913</td>
<td>15.178</td>
<td>5.792</td>
</tr>
<tr>
<td>One Year of Exposure</td>
<td>.913</td>
<td>1.195</td>
<td>.055</td>
</tr>
<tr>
<td>Three Years of Exposure</td>
<td>1.320</td>
<td>2.047</td>
<td>.046</td>
</tr>
<tr>
<td>Co-teaching</td>
<td>-.1725</td>
<td>1.149</td>
<td>-.104</td>
</tr>
<tr>
<td>Spring MAP Math RIT Gr. 3</td>
<td>.710</td>
<td>.070</td>
<td>.701</td>
</tr>
<tr>
<td>Free/Reduced</td>
<td>3.875</td>
<td>3.167</td>
<td>.085</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Spring MAP Math RIT Score Gr. 6

Research Questions and Answers

Research Question 1: What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (years) to inclusionary classes over a three-year period.

In the model of best fit that excluded two years of exposure (redundancy) and total minutes of exposure (highest collinearity), co-teaching had a VIF of 1.029. Within this model, the included variables predicted 46% of the variance in the spring MAT math RIT scores in Grade 6. Therefore, results of this study indicate that one year of exposure, three years of exposure, co-teaching (SE), spring MAP math Grade 3, and free or reduced-cost lunch are statistically significant predictors of spring MAP math RIT scores in Grade 6 ($p = .000 < .05$); however, years of exposure were not statistically significant predictors of math achievement. Excluding the influence of free or reduced-cost lunch, the strongest predictor of Grade 6 math performance was the independent variable spring MAP math RIT Grade 3 ($p = .000 < .05$). The null hypothesis was retained. There was no
statistically significant difference between the achievement scores of general education elementary students as measured by the NWEA MAP assessment and exposure (years) to inclusive classroom environments.

**Research Question 2:** What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and the amount of time exposed (total minutes per day) to inclusionary classes over a three-year period,

In the model of best fit that excluded two years of exposure (redundancy) and total minutes of exposure (due to high collinearity), co-teaching had a VIF of 1.029. Within this model, the included variables predicted 46% of the variance in the spring MAP math RIT scores in Grade 6. Therefore, results of this study indicate that one year of exposure, three years of exposure, co-teaching (SE), spring MAP math Grade 3, and free or reduced-cost lunch are statistically significant predictors of spring MAP math RIT scores in Grade 6 ($p = .000 < .05$); however, total minutes of exposure which had the highest initial VIF value (10.186) was not a statistically significant predictor of math achievement. Excluding the influence of free or reduced-cost lunch, the strongest predictor of Grade 6 math performance was the independent variable spring MAP math RIT Grade 3 ($p = .000 < .05$). The null hypothesis was retained. There was no statistically significant difference between the achievement scores of general education elementary students as measured by the NWEA MAP assessment and the amount of exposure (total minutes per day) to inclusive classroom environments.

**Research Question 3:** What is the relationship, if any, between the NWEA MAP mathematics scores of general education sixth grade students and exposure to co-teaching (special education) environments within a three-year period.
In the model of best fit that excluded two years of exposure (redundancy) and
total minutes of exposure (highest collinearity), co-teaching had a VIF of 1.029. Within
this model, the included variables predicted 48% of the variance in the spring MAT math
RIT scores in Grade 6. Therefore, results suggest that one year of exposure, three years of
exposure, co-teaching (SE), spring MAP math Grade 3, and free or reduced-cost lunch
are statistically significant predictors of spring MAP math RIT scores in Grade 6 ($p =
.000 < .05$); however, co-teaching ($p = .213 > .05$) was not a statistically significant
predictor of math achievement. Excluding the influence of free or reduced-cost lunch, the
strongest predictor of Grade 6 math performance was the independent variable spring
MAP math RIT Grade 3 ($p = .000 < .05$). The null hypothesis was retained. There was no
statistically significant difference between the achievement scores of general education
elementary students as measured by the NWEA MAP assessment and exposure to co-
teaching (special education) classroom environments.

**Summary**

The results of this investigation indicate that although the inclusion of all
independent variables, years of exposure to inclusive classroom environments (one year
and three years), co-teaching (SE) environments, prior math performance (Grade 3
MAP), and socioeconomic status (free or reduced-cost lunch participation), predict
student performance on Spring MAP Math RIT Grade 6 scores, no variables in and of
themselves significantly predict future math achievement except prior math performance.
There was no statistical difference between the math achievement scores of general
education elementary students and the (1) amount of exposure (years), (2) amount of
exposure (minutes per day), and (3) exposure to co-teaching (SE) environments. General
education elementary students’ exposure to inclusive classroom environments does not
influence their math achievement over time (Grade 4 through Grade 6). Within this
analysis, the best predictor for student math achievement was the students’ prior
performance in mathematics. Chapter V includes an introduction, recommendations for
policy, practice, and future research, and conclusions.
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

Chapter V clarifies the purpose and findings of the study, determines conclusions in relation to the literature and research findings, provides recommendations for policy and practice, and proposes topics for future research. The creation of inclusive classroom environments is founded in law, educational practices, egalitarian tenets, and public and political demand. The theoretical framework of the study was guided by production function theory, ethical imperatives, and learning theory.

There are financial costs to schooling and as such education leaders and policy makers need to make sound decisions using cost-benefit analysis; these analyses need to include objective measures based on research, theory, and sound practice. The ethical imperatives and egalitarian tenets of America’s schools coupled with case law further support inclusive classroom environments that reflect the natural proportions of the nation. The increasing public and political demands on educators, which include but are not limited to No Child Left Behind, the Individuals with Disabilities Improvement Act, the Common Core State Standards, NJ DOE state assessments (PARCC), and teacher evaluations and tenure policies (NJAchieve), have increased accountability. However, there may be more to public education than academic achievement that cannot be measured through a business model focused on standardized test scores; students are not widgets.

The purpose of this non-experimental, correlational, cross-sectional, explanatory, quantitative study was to explain the influence of student exposure to inclusive school
environments (in-class support, general education basic skills instruction) and co-teaching (special education)) on mathematics achievement of general education elementary students as measured by adaptive achievement tests (NWEA MAP mathematics) over multi-year periods. This one-district case study also explored the influence of placement within co-teaching classroom environments on general education elementary student mathematics achievement over time. The study was guided by the central research question: To what extent does the exposure to inclusive classroom environments over multi-year periods influence the mathematics achievement of general education students when controlling for student variables? This question was explored via simultaneous multiple regression analyses. The results of the study revealed that the inclusion of all independent variables (one year of exposure, two years of exposure, three years of exposure, exposure to co-teaching classrooms, Grade 3 math results, and socioeconomic status) was predictive of student performance on Grade 6 mathematics assessments. Only one variable was in and of itself predictive: Grade 3 math scores.

**Recommendations for Policy and Practice**

The model of best fit predicted 48% of the variance in the spring MAP Math RIT scores in Grade 6 and included one year of exposure, two years of exposure, three years of exposure, co-teaching, spring MAP Math RIT Grade 3, and socioeconomic status. The model was found to be statistically significant ($p = .000 < .05$). The independent variables of exposure (years and minutes per day) and co-teaching environments were not found to significantly influence student achievement results in mathematics. The only significant independent variable influencing student achievement results in mathematics from Grade 3 to Grade 6 was spring MAP Math RIT Grade 3 ($p = .000 < .05$). The extensive
literature review and research does provide consideration for the implementation of several policies and practices. The following section presents these implications through a review of the presented literature.

Researchers Manset and Semmel (1997) and Sapon-Shevin (1995) have stated that inclusion is a moral imperative (Manset & Semmel, 1997) and maintain that others need to defend exclusion (Sapon-Shevin, 1995). This study found no significant positive or negative impact on academic achievement of general education students when exposed to inclusionary environments. These findings do not support the exclusion of identified special education or basic skill students when considering principles of justice. Rawls (1971) supports equal access to the political, social, and economic liberties and also considers the disadvantages of the weak. Based on their classifications as special education or basic skills, it can be assumed these students are unlike their general education peers. By segregating identified students, they are not able to fully participate in society. Support for a democratic society made of natural proportions is reinforced by the works of philosophers such as Plato and Aristotle. The very creation of homogeneous elementary classroom environments alters the natural balance. The academic achievement of general education students was not impacted by the inclusion of identified students. With no measurable academic impact within this study, it is hard to argue for exclusion within an egalitarian democratic society.

Numerous studies support inclusion based on the lack of negative impact(s) on the academic achievement of general education students (Brady, 2010; Brewton, 2005; McDonnell et al., 2003; Robinson, 2012; Trabuco, 2011). The inclusion of identified special education students did not negatively influence the general education students’
performance in English Language Arts and/or mathematics in all of these studies. Larger research studies (Center on Education Policy, 2011; Sunderman, 2001) found similar results when basic skills supports were delivered in the classroom. The positive growth (social-emotional and/or academic) of the identified students supported the models presented in this study as well as democratic ideals. The works of Piaget and Bandura support balanced learning environments in which students have the ability to learn from one another. When making decisions on instructional supports, education leaders must consider the greater good. Programs should be designed to develop the whole child—mind, body, and spirit.

Legislation supports inclusionary practices under the Fourteenth Amendment (Equal Protection Clause), Free Appropriate Education (FAPE), and Least Restrictive Environment (LRE) and is further reinforced through funding (ASA, IDEA, Title I, Title III). The theories of educators, including Bandura, Piaget, Rawls, and Vygotsky, support the positive social-emotional and academic impact as well as the ethical implications of inclusion. Educational leaders need to be mindful of the law, egalitarian tenets, and educational theory when structuring their delivery systems and learning environments.

The normative data within the current study presented a normal curve and have a large range within the baseline MAP scores of the students. As a result, there may be some question with the overall balance within the classroom. Slavin (1988) suggested a 10-30-60 balance between low, average, and high achievers. Researchers suggest that general education and special education students benefitted from lower student-teacher ratio, more diverse instructional strategies, and increased collaboration between teachers (Cook & Friend, 1995).
Program initiatives such as Response to Intervention (RTI) are focused on specific student needs and consider the frequency and duration of the instruction/intervention (Wright, 2007). Education leaders must pay attention to the details of the programs they are attempting to emulate. Tolerance Theory (Gerber & Semmel, 1985) suggests that teachers and schools cannot meet the needs of a diverse student population with a myriad of instructional needs given limited resources. If educational leaders make informed decisions, the impact of their choices may be greater.

Within the present study, co-teaching appeared to have an influence on general education student math achievement when coupled with amount of exposure. When co-teaching was included in the various regression analyses, the VIF levels decreased. The research has demonstrated mixed results in regard to the impact of co-teaching environments. Demeris et al. (2007) found that as the number of special education students increased, their achievement scores increased as well; this result may have been influenced by more inclusive teaching practices or a greater esprit de corps. The perceptions of students are important.

Daniel and King (1997) found that the perceived self-esteem of general education students in inclusive settings was lower than their non-included general educations peers while their academic achievement scores held steady. Bandura’s work on self-efficacy and the social learning theory of Vygotsky and Piaget may help to explain this phenomenon. As education leaders develop inclusive classroom environments, stakeholder thoughts and perceptions need to be considered and addressed.

The research supports professional development in order to ensure inclusive instruction is delivered coherently and with fidelity. Within the Programme
d’intervention après des élèves a risqué (PIER), general education students outperformed their non-included general education peers. The coherence of this program suggested that training and program fidelity are influential in the research results and student impact. When properly supported, general education and special education teachers were open to implementing inclusionary practices (Villa et al., 1996). Overall, prepared general education, special education, and basic skills teachers have a more positive outlook in regard to their students and instruction. Staff development was supported by the works of Bake, Wang, and Walberg (1995).

Best practices suggested surveying all stakeholders in order to tackle potential problems and to focus programs where deemed beneficial. Training for all stakeholders has an impact on the success of the program. Jackson and Davis (2000) found a positive impact on program delivery and student achievement when parents were knowledgeable and provided with workshops and training. As education leaders design inclusive classroom environments, they must consider and plan professional development and trainings for all stakeholders.

Although class size and/or student-teacher ratio was not directly examined within the current study, based on the evidence within the Tennessee STAR study and other similar research, considerations for class size should be made when structuring schools. The education leaders within this school may consider increasing the number of homerooms if instructional space is not limited. Based on the staffing structures, there are enough certificated staff members to double the number of homerooms. The STAR study focused on primary classrooms (Grades 1 through 3). Within the current study, the single predictor of student achievement over time was the students’ scores in Grade 3. If
through smaller class-size achievement gaps can be prevented, academic regression over the summer is limited, and students have stronger gains in the primary grades, the students within this district may achieve higher overall mathematics scores in Grade 6.

Education leaders must consider their resources (staffing and instructional space) and timing (age and grade levels) within which their initiatives take place. The advertising adage of “get them when they’re young” holds true in education. Resources spent in the earlier grades may provide exponential benefits in the future. Education leaders must consider the timing of their initiatives and the potential for sustained and rippling effects.

Production function theory (Pritchett & Filmer, 1997) served as the theoretical framework for the present study. There are numerous external input factors and school-controlled process factors that impact student learning. Inclusive classroom environments are a process factor which impacts resources and potentially student learning. Education leaders need to be mindful of individual student needs and the costs of their initiatives. At times, the inclusive classroom is not in the best interest of the identified student. If services are sophisticated and reliable, self-contained classrooms may be appropriate (Heubert, 1994). One can argue that inclusive classrooms are less costly. Campbell and Stanley (1996) found inclusive classrooms to be more prudent and fiscally responsible. “How we spend the money and the incentives we create for both children and teachers are equally important” (Greenwald, Hedges, & Laine, 1996, p. 385). Education leaders should frame and consider their initiatives through cost-benefit analysis. Their initiatives will be guided by the specific needs of their school community. The moral and ethical implications of their choices must be considered as well as the overall cost.
Recommendations for Future Research

This investigation reviewed many of the issues and concerns regarding inclusive classroom environments and the academic achievement of non-identified general education students. The results suggested that exposure to inclusive classroom environments does not impact the mathematics achievement of general education students. The review of the literature revealed that many studies reached the same conclusions: that the placement of general education students in inclusive classroom settings does not have a negative impact on their academic achievement (Affleck et al., 1988; McDonnell, et al., 2003; Sharpe, York, & Knight, 1994, Staub & Peck, 1994); these studies also suggest no positive impact. Delimitations, limitations, and threats to validity (internal and external) specific to this study have been presented and have led to several recommendations for future research.

With the increasing call for accountability and the evaluation of teacher proficiency and effectiveness linked to standardized assessments, it is important for education leaders and policy makers to consider classroom designs and configurations. Although the data from this study did not demonstrate an impact on general education students’ academic achievement, past research has demonstrated positive academic as well as social-emotional impact on identified and non-identified students based on the classroom environment/structure (Fryxell & Kennedy, 1995; Logan et al., 1994-1995; Peltier, 1997; Rea, McLaughlin, & Thomas, 2002; Salend & Duhaney, 1999; Walter-Thomas, Bryant, & Land, 1996). To fully consider the issues and concerns revolving around the practice of inclusion, future research on the following topics should be conducted:
1. Review the data from this study and cluster students’ Grade 3 growth into RIT norm values available from NWEA in order to determine the influence of inclusion on the various achievement levels of general education students. The normative data for the present study set the initial general education Grade 3 RIT at a mid-grade 3 level (199) and the high at end-of-grade 9 (236). Even for the most proficient teacher, this is a wide range of mathematics abilities to address effectively even with the in-class support of additional staffing.

2. Recreate this quantitative study and include qualitative measures; e.g., student, teacher, instructional aides, administrator, and/or community questionnaires. Teacher attitudes and expectations may have influenced student achievement. Qualitative data may have provided further insight into the effectiveness of the instruction occurring in the various classrooms over the three years of data collection.

3. Further explore the impact of co-teaching classroom environments. When co-teaching was included in the analysis, the variance inflation factor decreased for all measured variables. The academic and social-emotional impact of co-teaching environments warrants further research.

4. Recreate this quantitative study and include qualitative observation measures; e.g., classroom observations, teacher evaluation tools, etc. The lack of impact may be a result of poor program coherence and/or fidelity. There are several models of inclusion (Gartner & Lipsky, 1997).

5. Review the data of other district factor group schools in New Jersey and across the country. By extending this study, factors such as school funding,
socioeconomic status, teacher certification, training, and salary, and geographic location could produce additional results. Such studies would provide a more comprehensive understanding of local influences on the practice of inclusion on academic achievement.

6. Explore the impact of inclusive classroom environment over extended (e.g., K-3, K-6, K-8, K-12) and varied (K-3, 3-6, 7-8, 8-12) grade spans. The researcher focused on an elementary setting. The impact of inclusive classroom environments may vary over time and by setting (middle school and high-school).


8. Recreate this study focusing on English Language Arts concentrating on reading and/or writing growth. The nuances between the content and skills instructed in ELA as compared to mathematics may have varied results. By coupling ELA and gender to additional analyses, interesting results may be discovered and conclusions found.

9. Investigate the impact of race.

10. Complete an analysis within schools that homogeneously group students for math instruction at the various grade levels. The school within this investigation was unique in size; there was a large student population and ten to eleven homerooms per grade level. The fact that the classes were
heterogeneously grouped may have impacted the students’ overall growth. Although the normative data presented a normal bell curve, the shape of the curve may have been more extended as compared to a smaller school in a less diverse community.

11. Explore the impact of professional development in order to determine the type of inclusive instruction occurring, the program strength (coherence and fidelity), and teacher preparedness. There are also key areas of professional development that are directly impacting America’s classroom that include but are not limited to the Common Core State Standards, differentiated instruction, and technology.

Conclusions

Twentieth century educational practices continue to be investigated in order to determine the influence of a multitude of variables on the academic achievement of students (Caldas, 1993). The findings of the present study can be used to answer parental concerns about a weaker curriculum or decreased rigor in inclusive classroom environments. There was no statistical difference between the math achievement scores of general education elementary students and the (1) amount of exposure (years), (2) amount of exposure (minutes per day), and (3) exposure to co-teaching (SE) environments. Within the parameters of the present study, general education elementary students’ exposure to inclusive classroom environments did not influence their math achievement over time. Production function theory, coupled with the egalitarian and Jeffersonian beliefs of the American school system, helped to frame this research. Inclusive classroom environments promote natural proportions and support the works of
Aristotle, Murphy, Piaget, Plato, and Vygotsky. Educators and policy makers must consider the data when making decisions. To promote the greater good/goal of supporting all students, permitting them, as individuals, to reach their greatest potential, policies need to be formulated based on best practices guided by scientific research and sound theory.
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Zigmond, N., Jenkins, J., Fuchs, L. S., Deno, S., Fuchs, D., Baker, J. N., Jenkins, L., &
Appendix A

Approval letter from the Superintendent(s) of Schools

HARRISON TOWNSHIP SCHOOL DISTRICT
120 N. MAIN STREET
MULLICA HILL, NJ 08062

Phone: (856)478-2016   Fax: (856)478-4825

Patricia Hoey, Ed.D.
Superintendent of Schools

Robert Scharlé
Business Administrator

Patricia L. Haney
Director of Curriculum

Joan P. Ruberton
Supervisor of Student Services

January 29, 2008

Andrew P. Davis
1828 West Point Drive
Cherry Hill, NJ 08003

Dear Mr. Davis:

I will honor your request to use archival N.W.E.A Measurements of Academic Progress (MAP) mathematic assessment data on students from the class of 2006-2007 and 2007-2008 in your research work. This permission is given with the understanding that no student names will be utilized in the final research document.

I look forward to following your progress during the dissertation process. I will be interested in the results and any information it may lend to future decisions related to district programming.

Sincerely yours,

Patricia Hoey, Ed.D.
Superintendent of Schools

cc: File
Appendix B

Board of Education Motion to Approve Data Use

HARRISON TOWNSHIP BOARD OF EDUCATION
120 N. Main Street
Mullica Hill, New Jersey 08062
(856) 478-2016
Fax (856) 478-0699

Dr. Missy Pereiti
Superintendent

Robert E. Scharle
School Bus. Admin/Board Sec.

Certification of Minutes

March 30, 2011

State of New Jersey
County of Gloucester

I, Robert E. Scharle, Secretary of the Board of Education of the Township of Harrison in the County of Gloucester, State of New Jersey, hereby certify that the foregoing extract is from the Minutes of the Meeting of the Township of Harrison Board of Education held on March 28, 2011.

Robert E. Scharle, Board Secretary

Seal of the Township of Harrison
Board of Education

Motion: Approval of the request of Andrew P. Davis to utilize archival district student data to investigate the impact of achievement-based student ability groupings at the sixth grade level, in support of his dissertation.

Motion: Mr. Williams
Vote: Roll Call (8-0-1)
(Mr. Olsen - absent)

2nd, Mr. Fuller
Carried: Yes
Appendix C

Institutional Review Board – Non-Review Certification

IRB Non Review Certification

STUDENT: Andrew P. Davis

Title of Dissertation: The Influence of Exposure to Inclusive School Environments on the Mathematical Achievement of General Education Elementary School Students

I certify, by my signature below, that the above indicated study does not require IRB review as a result of a lack of involvement with human subjects (see OHRP flow chart) and as indicated by any or all of the following (check all that apply).

1. Historical research  
2. Public database  
3. Proprietary database ✔️  
4. Freedom of Information  
5. Right to know – sunshine law  

Student signature: [Signature] 9-19-12

Advisor approval: [Signature]

Reviewed by:  
Marty Finklestein – Higher Ed  
Daniel Gutmore – K-12

* Proprietary data that do not identify individuals
Appendix D

Basic Skills Criterion 2004-05 through 2006-2007

Grade 4: 2004-05

The Basic Skills Program is delivered in a tiered approach based on the intensity of the intervention that a student needs. The two tiers include services received from an instructional aide or from a basic skills instructor.

The services of basic skills instructor are provided in classrooms for those students in grade 1 through 6 who would benefit from intense direct intervention that a teacher can provide on a regular basis.

- Clustered students who scored below 195 on the NWEA Measures of Academic Progress (MAP) Spring 2004 RIT math assessment.

Grade 5: 2005-06

The Basic Skills Program is delivered in a tiered approach based on the intensity of the intervention that a student needs. The multiple tiers include services received from an instructional aide or from a basic skills instructor.

Basic skills instruction is provided by instructional assistants in third grade and by a basic skills instructor in grades 4 to 6. These additional resources in the room provide the classroom teacher with the ability to form flexible groups so that the students who are performing below grade level expectations have an opportunity for daily small group instruction in mathematics.

- Students who score below 200 on the NJ ASK 4 – or – who scored below 200 on the MAP Spring 2005 RIT math assessment.

Grade 6: 2006-07

Basic skills instruction is provided by instructional assistants in third grade and by a basic skills instructor in grades 4 to 6. These additional resources in the room provide the classroom teacher with the ability to form flexible groups so that the students who are performing below grade level expectations have an opportunity for daily small group instruction in mathematics.

- Students who score below 211 on the MAP Spring 2006 – or –
- ASK 5 Math score below 200
### Appendix E

Classroom Configurations 2004-2005 through 2006-2007

#### Grade Level Classroom Supports

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Classroom Supports</th>
<th>General Education</th>
<th>Special Education</th>
<th>Basic Skills Instruction</th>
<th>SE &amp; BSI</th>
<th>Total Homerooms</th>
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#### Grade Level Student AYP Sub-Group Demographics

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<th>2005-2006 (%)</th>
<th>2006-2007 (%)</th>
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<td>Students with Disabilities</td>
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<td>Other Race</td>
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<td>Economically Disadvantage</td>
<td>8.5</td>
<td>8.5</td>
<td>7.0</td>
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Student Population: 227 Students, 237 Students, 225 Students
## Appendix F

### NWEA MAP Marginal and Test-Retest Reliability Estimates

#### Reliability Estimates of Measure of Academic Progress and Achievement Level Tests

<table>
<thead>
<tr>
<th>Type of Study</th>
<th>Data Set</th>
<th>Reliability Estimates</th>
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<th>Term</th>
<th>Grade Levels</th>
<th>Tests</th>
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<td>r</td>
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<td>Reading</td>
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<td>Fall</td>
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<td>Reading</td>
<td>Fall</td>
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### Table Notes
- **Type of Study** refers to whether the study was marginal or test-retest.
- **Data Set** indicates the year and type of data set used.
- **Reliability Estimates** include the reliability coefficients for each test.
- **Test Type** specifies whether the test was administered in the fall or spring.
- **Content Area** and **Term** detail the specific content areas and terms for which reliability estimates were calculated.
- **Grade Levels** specify the grade levels for which reliability estimates are provided.
- **Tests** indicate the number of tests included in the analysis.

---

#### Additional Statistical Data

| Appendix F | NWEA MAP Marginal and Test-Retest Reliability Estimates | 153 |
### NWEA MAP Marginal and Test-Retest Reliability Estimates

#### Reliability Estimates of Measure of Academic Progress and Achievement Level Tests

<table>
<thead>
<tr>
<th>Type</th>
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<th>Test Type</th>
<th>Content Area</th>
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<th>Grade Level</th>
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154
### NWEA MAP Concurrent Test Validity by State

#### Appendix G

#### Validity Evidence for Measures of Academic Progress and Achievement Level Tests

| Type | Data Set | Yr | Form | Content Area | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|----------|----|------|--------------|---|---|---|---|---|---|---|---|---|---|
| Concurrent | Arizona Instrument to Measure Standards (AIMS) scale scores and ALT and MAP scores | 2003 | Spring | Reading | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | California Standards Test (CST) scale scores and MAP and ALT scores | 2003 | Spring | Reading (NWEA/ELA CST) | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Language Usage (NWEA/ELA CST) | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | Colorado Student Assessment Program (CSAP) scale scores and ALT scores | 2003 | Spring | Reading | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Language (CSAP Writing) | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Language (CSAP Language Usage) | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Concurrent | Iowa Tests of Basic Skills (Form K) and Minnesota Checkpoint Level Tests | 2004 | Spring | Reading | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Language | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics (Iowa) | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | Mathematics (Basic Skills) | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

### Table Notes
- Yr: Year
- Form: Form of the test
- Content Area: Content area of the test
- Grade Level: Grade level of the test

### Appendix G

#### NWEA MAP Concurrent Test Validity by State

#### Validity Evidence for Measures of Academic Progress and Achievement Level Tests

| Type | Data Set | Yr | Form | Content Area | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|----------|----|------|--------------|---|---|---|---|---|---|---|---|---|---|
| Concurrent | Arizona Instrument to Measure Standards (AIMS) scale scores and ALT and MAP scores | 2003 | Spring | Reading | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

### Table Notes
- Yr: Year
- Form: Form of the test
- Content Area: Content area of the test
- Grade Level: Grade level of the test

### Appendix G

#### NWEA MAP Concurrent Test Validity by State

#### Validity Evidence for Measures of Academic Progress and Achievement Level Tests

| Type | Data Set | Yr | Form | Content Area | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|----------|----|------|--------------|---|---|---|---|---|---|---|---|---|---|
| Concurrent | Arizona Instrument to Measure Standards (AIMS) scale scores and ALT and MAP scores | 2003 | Spring | Reading | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | Mathematics | r | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

### Table Notes
- Yr: Year
- Form: Form of the test
- Content Area: Content area of the test
- Grade Level: Grade level of the test
### NWEA MAP Concurrent Test Validity by State

#### Validity Evidence for Measures of Academic Progress and Achievement Level Tests

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<td>Palmetto Achievement Challenge Tests (PACT) scale scores and MAP and ALT scores</td>
<td>2003</td>
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