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SUMMER LEARNING LOSS: THE INFLUENCE OF SUMMER SCHOOL
PROGRAMS ON STUDENT ACHIEVEMENT IN LANGUAGE
USAGE, MATH, AND READING

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ABSTRACT

The purpose of this quantitative study was to analyze the effects of summer school remediation on elementary student achievement, while controlling for the effects of gender, socio-economic status (SES), and ethnicity, by comparing the differences between pre-test and post-test scores on the Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) for matched pairs (based on pre-test scores) of summer school participants and non-summer school participants for each of five years. The independent variables included summer school participation, gender, SES, and ethnicity. The dependent variables included the student post-test NWEA MAP scores in each of three subject areas (language usage, reading, and math) for each grade level (2–5), in each year of the study. The covariates included the student pre-test NWEA MAP scores in each of the same subject areas and grade levels for each year of the study.

Study participants were convenience samples of summer school students and their non-summer school counterparts in grades 2–5 from multiple elementary school sites within a single school district in northeast Indiana. As summer school programming remained the same for each year of the study, scores from each of the five years were combined for analysis according to subject and grade level to lend an overall perspective. For language usage, data was collected for 850 matched pairs of students. For math, there were 828 matched pairs. The study also included 853 matched pairs of students for reading.

Analysis of covariance (ANCOVA) at the .05 probability level ($p=.05$) was used to determine if there was a statistically significant difference between student post-test scores for summer school participants and their non-summer school counterparts, while controlling for gender, SES, and ethnicity. In order to isolate the effects of summer school for each grade level (2–5), there were 4 separate analyses, one for each elementary grade level, and 3 sub-analyses within each grade level – reading, language usage and math—leading to a total of 12 sets of ANCOVA analyses.

The results of ANCOVA analysis showed a significant interaction effect between summer school participation and SES for both language usage and math in grade 2. However, there were no significant interaction effects or main effects of the independent variables on post-test reading scores for second graders.

For third grade, ANCOVA analysis showed a significant interaction effect between summer school participation and SES for language usage. Participation in summer school was shown to have a significant main effect on post-test reading scores with summer school students scoring significantly lower than their non-summer school counterparts.

In grade four, ANCOVA analysis revealed a significant interaction effect between summer school participation and gender for language usage. SES showed a significant main effect on post-test math scores, with paid lunch students performing significantly better than their free/reduced lunch peers for both summer school and non-summer school student groups. Participation in summer school was shown to have a significant main effect on post-test reading scores in fourth grade, with summer school students scoring significantly lower than their non-summer school counterparts.

For grade five language usage students, each of the main effects of gender, ethnicity, and SES were statistically significant. Ethnicity was shown to have a significant main effect on post-test math scores with White students scoring significantly higher than students of all other ethnicities, regardless of participation in summer school. There were no significant interaction effects or main effects of the independent variables on post-test reading scores for fifth graders.

These results indicate a need of review, revision, and refinement at all grade levels (2–5) and in all subjects (language usage, math, and reading) of the summer remediation programming within the study in order to effectively serve the needs of its students. Further, the study serves as a model and a call to action for educational administrators who are ready to engage in an objective analysis of summer school program effectiveness and are willing to embrace whatever shifts in operational or instructional paradigms may be needed for improvement.

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CHAPTER 1

Introduction

Summer learning loss has been a topic of scholarly investigation for more than 100 years, with one of the earliest studies dating back to 1906 (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996). Although much has changed within the educational community in the century since that study, the issue of summer learning loss has met with neither resolution nor obsolescence. More recent studies quantified the summer decline of student test scores at approximately one month overall, with math and spelling showing larger effects than other subject areas, except for students of low socio-economic status (SES) who showed greater declines in reading. Findings by Alexander, Entwisle, and Olson (2001), and Burkam, Ready, Lee, and LoGerfo (2004) supported those of Cooper et al., while underscoring a relationship between summer learning loss and SES.

The existence of summer school programs predates even the earliest recorded studies of summer learning loss. As early as the 1880s, educators offered summer programs for students with limited English proficiency, as well as for those who fell behind in their studies. Since that time, summer programs have served multiple functions, including, but not limited to preventing delinquent behaviors, remediation or prevention of learning deficits (including summer learning loss), enrichment, extended-time activities for disadvantaged youth, and insuring that students with disabilities receive a free and appropriate education in keeping with the Individuals with

Disabilities Act (Cooper, Charlton, Valentine, & Muhlenbruck, 2000). While the use of summer school programs did not originally arise in direct response to studies on summer learning loss, those studies have served as an impetus for intentionality of summer programming and rigorous evaluation of program success (Cooper et al., 2000).

Few studies have been reported that investigate the effectiveness of summer school programs over more than one year of implementation. Roderick, Jacob, and Bryk (2004) investigated the effectiveness of the Chicago Summer Bridge program over the first three years of operation. During that same year, Portz (2004) investigated the effectiveness of the Boston Public Schools Transition Program, which spans a window of up to 15 months. Results of both studies indicated that the programs were effective in raising student achievement levels in reading and math, thereby offsetting summer learning loss for program participants. While these studies lend perspective on summer program effectiveness over time, there is clearly a need for additional research over multiple years. Borman (2000) also identified the need for studies investigating the longitudinal effects of single-year summer programming on student achievement.

Studies by Cooper et al. (1996) and Alexander et al. (2001) found no significant influence of gender on summer learning; however, Phillips and Chin (2004) were able to identify a relationship between gender and summer learning loss. The discrepancy in findings suggests a need for further investigation.

The current study attempted to contribute to the knowledge base by examining the impact of single-year summer school programming on student achievement over a period of five years. The study also explored the relationships between gender, SES, ethnicity, and summer learning.

Statement of Problem

As educational communities have continued to operate according to the traditional nine-month school calendar, students have experienced varying degrees of learning loss associated with extended summer vacation periods. The implementation of summer school programs has been one of the most widely used approaches to offset the learning loss that occurs over the summer break. While this approach offers some benefits, such as aligning with the regular school calendar, limiting the number of students served within the program, and allowing a focus on students who may be at risk of academic failure, the simple existence of the program does not ensure its effectiveness. As noted by Cooper (2001), “The impact of summer educational programs has to be evaluated on its own merits” (p. 3).

This study arose in response to practical concerns similar to those confronting many school districts across the nation: Is a non-scripted summer remediation program effective in positively influencing student achievement in reading, language usage, and math for students in grades 2–5? Further, do gender, SES, and ethnicity play roles in the effectiveness of the summer school remediation program?

Purpose of Study

The purpose of this quantitative longitudinal study was to better understand the effects of summer school remediation on elementary student achievement. The study compared the differences between student performance data on spring and fall administrations of Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) for matched pairs (based on student performance on NWEA MAP) of second through fifth grade summer school participants and non-summer school participants for each of five years, beginning in the summer of 2003. The independent variables included summer school participation, gender, SES, and

ethnicity. The dependent variables included the student Rasch Unit (RIT) scores on the fall administration of the NWEA MAP test (post-test) in each of three subject areas (language usage, reading, and math) for each grade level (2–5), in each year of the study under investigation. The covariates included the student RIT scores on the spring administration of the NWEA MAP test (pre-test) in each of the same subject areas and grade levels in each year of the study under investigation.

Research Question

After controlling for gender, SES, and ethnicity, was there a significant difference in student achievement in reading, language usage, and math for second through fifth graders based upon participation in a summer remediation program?

Null Hypotheses

H₀1: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for second graders based upon participation in a summer remediation program.

H₀2: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for second graders based upon participation in a summer remediation program.

H₀3: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for second graders based upon participation in a summer remediation program.

H₀4: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for third graders based upon participation in a summer remediation program.

H₀5: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for third graders based upon participation in a summer remediation program.

H₀6: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for third graders based upon participation in a summer remediation program.

H₀7: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fourth graders based upon participation in a summer remediation program.

H₀8: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fourth graders based upon participation in a summer remediation program.

H₀9: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fourth graders based upon participation in a summer remediation program.

H₀10: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fifth graders based upon participation in a summer remediation program.

H₀11: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fifth graders based upon participation in a summer remediation program.

H₀12: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fifth graders based upon participation in a summer remediation program.

Significance of Study

The significance of this study was to determine whether a non-scripted summer school remediation program positively influenced the level of student achievement in reading, language usage, and math, as well as examined the relationship between that achievement and gender, SES, and ethnicity. While the study contributes to the existing body of literature addressing the effectiveness of summer school programs, it also serves as a model for practicing educational administrators.

One aspect of the study's significance lies in its matched-pairs design, whereby summer school participants were matched with their non-summer school counterparts based upon pre-test scores on NWEA MAP. This design allowed analysis of post-test data from summer school and non-summer school students who were found to have performed at the same levels in reading, language usage, and math prior to any of the year's summer programs. Therefore, differences that were seen to have occurred between pre- and post-test performance in each subject area were more likely to be attributable to the summer school program than to pre-existing differences in ability levels among study participants (Gravetter & Wallnau, 2000).

Another aspect of the study's significance was in the selection of the NWEA MAP as pre- and post-testing instruments. Unlike testing instruments that measure results according to grade level equivalents, NWEA test results are reported using the RIT (Rasch Unit) scale. As noted by Cooper et al. (2000), pre-test and post-test estimates, "...might be inflated by the use of grade-equivalent test scores that increase over time simply due to their metric" (p. 90). Instead,

the RIT score is an equal-interval score that directly relates to the curriculum scale in each subject, rather than having a basis in the performance level of specified student groups. These scores can be added together to calculate accurate class or school averages, and are stable, direct indicators of student achievement (NWEA, 2001a).

With its focus on the comparative student achievement levels between summer school participants and their non-summer school counterparts within a single district over a five-year period, this study attempted to bridge the gap between research findings and real-world implementation. It serves as a model for those districts that are ready to take the next step beyond simply using data for the identification of levels of student achievement. It is for those ready to move beyond the examination of measures of central tendency and patterns and trends in student achievement. This study is a model for those educational administrators who are ready to engage in an objective, introspective analysis of program effectiveness and are willing to embrace whatever shifts in operational or instructional paradigms may be needed for improvement.

Delimitations

This study was confined to the following: (a) One Indiana school district with eleven elementary schools, (b) single-year summer school programming across a five-year timeframe, (c) non-scripted summer school programming coordinated at the district level with all sites operating according to established guidelines, and (d) students in grades two through five.

Limitations

Several factors may have limited the extent to which this study determined the relationship between summer school program participation and student achievement levels and a relationship to gender, SES, and ethnicity:

1. Data tabulation and analysis was accurate.
2. Students were not randomly assigned to either the summer school group or the non-summer school group in any year of the proposed study. While random assignment to either group would have served the purpose of enhancing the experimental design, it would have done little to serve the overarching goal of improving student achievement.
3. The availability of non-summer school participants with the same pre-test RIT (Rasch Unit) scores in each subject area (reading, language usage, and math) as summer school students at the appropriate grade level for each year of the study limited the number of matched pairs. The RIT score is an NWEA established equal-interval score that directly relates to each subject area's curriculum scale and serves as an indicator of student achievement (NWEA, 2001).
4. The length of time between spring and fall administrations of the NWEA MAP test introduced the possibility that factors other than summer school may also have influenced student achievement.
5. Students may have had varying levels of experience with computer-adaptive testing methods and strategies as they related to NWEA MAP administration.

6. Achievement levels by summer school program participants may have been impacted by differences in summer school instructors' teaching styles and/or instructional practices.
7. The study did not attempt to address the relative differences in student achievement across grade levels or between/among subject areas.

Definition of Terms

The following terms are defined to clarify their use within the context of this study:

Computer adaptive testing is a process by which testing is administered via computer with questions displayed on individual computer screens and student responses are recorded via mouse or keyboard. The difficulty of the test adjusts to the level of student performance on the test to the point of the current question. The level of questioning becomes increasingly difficult with successive correct answers, or increasingly easier with successive incorrect answers. In an optimized test, a student would answer approximately 50% of the questions correctly. In the Northwest Evaluation Association Measures of Academic Progress, it would be unlikely for any two students to have many of the same test items, and a single student testing multiple times will not have repeated test items (NWEA, 2001a).

Ethnicity refers to the common heritage shared by groups of individuals. For the purposes of this study, students were identified as members of one of two groups: White and All Other Ethnicities.

Goal strand, also known as Goal Performance Areas, goal strands are categories for reporting student performance on NWEA MAP that are aligned to content areas within individual state standards. Examples include, but are not limited to, algebra functions,

computation, and data analysis in math, and interpretive and evaluative comprehension in reading (NWEA, 2007).

ISTEP+, which is the Indiana Statewide Testing for Educational Progress-Plus, is the state's test of student proficiency in English/language arts and math. Throughout the course of this study, *ISTEP+* was administered to students in grades 3, 6, 8, and 10 in the fall of each year. After piloting testing in English/language arts and math in grades 4, 5, 7, and 9 in 2003, *ISTEP+* was fully implemented in grades 3–10 in the fall of 2004. Testing in science was introduced for fifth graders in 2003, and for seventh graders in 2005.

Non-scripted is a non-scripted program that relies upon the training, experience, and personal creativity of each teacher to develop lesson plans to address the academic needs of the students in a particular classroom, as compared to a scripted program where lesson plans are carefully defined by the school, district, or commercial entity for consistency of implementation from classroom to classroom.

NWEA MAP is the Northwest Evaluation Association Measures of Academic Progress that consists of a series of computer adaptive assessments that measure students' general knowledge in reading, language usage, and math. Versions of NWEA tests in use in districts throughout Indiana have been specifically aligned to the content of the Indiana State Standards (Cronin & Bowe, 2005). NWEA MAP scoring has been aligned to scores from state-mandated assessments, such as *ISTEP+*, which has allowed researchers to develop estimates of fall and spring performance levels that allow educators to predict the success of students on *ISTEP+* (Cronin & Bowe, 2005). Since NWEA assessments are administered more than once each school year, they provide insight into changes in student performance levels over time, as well as at specific points in time.

Pre-test indicates that NWEA MAP was administered in the spring prior to a given session of summer school.

Post-test indicates that NWEA MAP was administered in the fall immediately following a given session of summer school.

RIT score is an equal-interval score that directly relates to the curriculum scale in each subject, rather than having a basis in the performance level of specified student groups. These scores, which generally range between 150 and 300, can be added together to calculate accurate class or school averages, and are a stable, direct indicator of student achievement (NWEA, 2001a).

Student achievement levels are operationally defined as the differences in student RIT scores between respective spring and fall NWEA MAP administrations in reading, language usage, and math for second through fifth grade summer school participants and their matched-pair counterparts.

SES is socio-economic status (SES) and refers to the combination of social and economic factors, which may include family income, levels of parental education, types of parental employment, and the existence and extent of social networks and resources. SES is defined within the educational community, as well as for the purposes of this study, by students' eligibility for programs providing free or reduced-price lunches (F/R lunches), subject to state and federal regulations and guidelines.

Summer learning loss represents the decline in student performance levels in identified subject areas that occurs over the summer break that is part of the traditional school calendar.

Summer school refers to any of the numerous programming options designed to provide enrichment, remediation, or other learning opportunities for students during the summer months

between regular school years. Specifically, to ensure a level of consistency, summer school programming within this study was coordinated through the school district's central office, with sites at elementary schools throughout the district, each focusing on grade-level appropriate standards-based remediation in reading, language usage, and math.

Traditional school calendar refers to the school calendar configuration where approximately nine months each year are allocated for regular educational programming, as prescribed by state and district guidelines, with approximately three months of hiatus during the summer months, with the exception of supplemental or remedial summer programming.

CHAPTER 2

Review of the Literature

Given the demands placed upon schools and districts from federal, state, and local levels, educators face a continuous challenge to demonstrate accountability for performance and improvement in student achievement. As educational administrators endeavor to optimize the utilization of both human and financial resources to meet this challenge, there arises the need to evaluate the effectiveness of programs in making a significant difference in student achievement levels. A recognition and understanding of the relationships between student performance outcomes and program effectiveness is, therefore, advantageous to educators as they implement, evaluate, and modify those programs.

Although many strategies, initiatives, and programs are part of on-going efforts within the educational community to positively impact student learning, one program that draws particular scrutiny is summer school. Gewertz (2000) acknowledges a question among educators as to whether the investment in summer school is properly placed, “especially in light of emerging research showing such programs’ mixed record of success in improving long-term student achievement” (p. 1).

While summer learning loss is a well-documented phenomenon in educational literature, it cannot be assumed that all summer school programs are effective in minimizing summer

learning loss or in increasing student performance levels. As Cooper (2001) so astutely phrased it,

The existence of summer learning loss cannot *ipso facto* be taken to mean summer educational programs will be effective remedial interventions. Summer school might not change the educational trajectory of students who took part in such programs. The impact of summer educational programs has to be evaluated on its own merits. (p. 3)

Drawing from Cooper's (2001) recommendation, the purpose of this study was to evaluate the merits of a summer school program over a five-year period by comparing student achievement levels in reading, language usage, and math of summer school participants with those of their non-summer school counterparts. A review of the literature identifies and describes the premises upon which the study was based, and is divided into six distinct sections: (a) Historical Overview, (b) Summer Learning Loss, (c) Impact of Summer School on Summer Learning Loss, (d) Impact of Gender and Ethnicity on Summer Learning Loss, (e) Measuring Student Achievement, and (f) Summer School Programs that Work.

Historical Overview

A historical examination of the evolution of the school calendar in relation to societal demands reveals that the present system arose, not as a concession to any single social construct, such as the agrarian culture, but as a matter of pragmatism. As far back as the 1840s, school calendars reflected the focus of the communities they served. In rural areas, where agriculture was the economic mainstay, students provided the human resources necessary to accomplish the planting, maintenance, and harvesting tasks associated with food production. Schools in these areas responded to this need by operating only five to six months of the year, from last harvest to first planting. By contrast, schools located in industrialized areas often operated on an 11 or 12

month calendar. For example, in 1841, schools in Boston and Philadelphia were open 244 days and 251 days per year, respectively (Association of California School Administrators, 1988).

The concept of dividing curriculum into grade levels was first implemented in 1847. This, coupled with an increasingly mobile population, served as an impetus for standardization of both grade level curriculum expectations and the school calendar. As schools in rural communities expanded their operational schedules to allow adequate time to address curricular requirements, schools in urban areas adjusted to the new requirements by shortening their regular school calendars. The melding of rural and urban patterns was neither instantaneous nor rigid. Even as the nine-month calendar gained acceptance through the 1880s, schools in urban areas instituted supplemental summer programs for students with limited English proficiency, as well as for those who fell behind in their studies.

By the turn of the century, with the nine-month school calendar becoming increasingly prevalent, the average student attended only 99 days of the 144-day school year, while educators continued to be responsive to the demands of their local communities (Funkhouser, Humphrey, Panton, & Rosenthal, 1995). One noteworthy example occurred in 1904, in Bluffton, Indiana, with Superintendent Wirt's introduction of a voluntary year-round program offering individualized classes. Several other voluntary year-round programs sprang up between 1912 and 1931, overlapping the implementation of mandatory year-round programs in two Pennsylvania school systems between 1928 and 1938 (Association of California School Administrators, 1988).

As the United States endured World War II, psychologists recommended that assembly-line workers receive paid vacation time away from their jobs in order to boost overall productivity. President Roosevelt acknowledged this recommendation by granting defense plant

workers compensation for vacations. With schools operating on a nine-month schedule, teachers were available to fill the need for qualified substitute workers. This symbiotic relationship among employers, workers, and teachers deepened the entrenchment of the nine-month school calendar in the American tradition.

In the 1950s, the country's attention was refocused on the educational system in response to two main events: the post-war baby boom and the launch of the Soviet satellite, Sputnik. By the 1960s, increased state and federal funding for education stimulated growth and innovation in both facilities and programs; however, this trend fell victim to economic woes caused by the energy crisis and inflation during the early to mid 1970s. Faced with dwindling financial resources and increasing enrollments, school districts in 22 states reintroduced one variation or another of a year-round calendar to meet the academic needs of their students.

As the decade of the 1970s came to a close, Americans called for a return to the basics in education, along with reform in taxes and governmental spending. Once again responding to social climate, year-round programs were abandoned or suspended in favor of returning to the uniformity of the traditional nine-month calendar. Despite the challenges posed to the educational system in the 30 years after the war, by 1979, the average student attended school 161 days each year (Funkhouser, et al., 1995).

As the country moved into the 1980s, the National Commission on Education Excellence once again attempted to focus the attention of the educational community on the issues of expectations, curricular content, and the amount of time spent in the classroom. Through its report, *A Nation at Risk*, the Commission urged educators and legislators alike to increase the time students spent in school as a means of improving the educational process so that students would be adequately prepared to successfully compete in the global market. In response, 37

states considered policies to extend the school year; however, few moved forward to actually adopt those policies. Where changes in policies were adopted, those changes represented efforts to extend instructional time in states that were operating well below the national average for time in school (Aronson, Zimmerman, & Carlus, 1999). From a practical standpoint, the momentum of extended year programs ebbed and flowed. As Richmond, Jr., (1977) noted:

Year-round school operations were generally reported as a crisis innovation which occurred in times of high building costs, population increases, and tight economy. During periods of decrease in population of the nation, the number of students served by the schools also decreases, and the year-round concept loses momentum. (p. 117)

From the mid-1980s and into the 1990s, researchers began to suggest that simply extending the amount of time in school would do little to positively impact student achievement without a corresponding improvement in the quality of instruction and an increase in the effectiveness and efficiency in the use of the time already allotted (Funkhouser, et al., 1995). Levin (1984) actively challenged the premise that increasing amounts of instructional time inherently benefited students. Levin cautioned the educational community and declared:

More ominous is the possibility that by increasing the *costs* to the student by having to spend more time in what is often an oppressive and uninspiring environment, dropout rates may increase and some students may be turned-off to further learning. Additionally, some students may reduce their effort to compensate for the larger time commitment that they must make. (p. 3)

Levin's (1984) stark portrayal of a learning environment poignantly devoid of inspiration, though certainly not generalizable to all educational settings, gives pause to teachers and administrators alike to reflect upon the qualitative effectiveness of instructional strategies,

resources, and objectives in impacting student achievement levels within classrooms, programs, schools, and entire school districts or corporations. This qualitative reflection, juxtaposed with the quantitative accountability for student achievement imposed by state and federal legislation within this millennium, challenges today's educators to not only engage in ongoing comprehensive evaluation of the effectiveness of practices and programs in facilitating learning and student achievement, but to modify those practices and programs to optimize effectiveness within established budgetary and time constraints. Rather than an end, that is, simply a demarcation of the timeframe within which specific quantities of information are transferred to students, today's school calendar becomes a guideline, or means through which the educational community provides effective service to its clients.

Summer Learning Loss

One of the problems associated with the traditional nine-month calendar, according to Kerry and Davies (1998) and Davies and Kerry (1999), is the learning loss that occurs as a result of long vacation periods. Proponents of the year-round educational calendar, the English researchers draw extensively from the Cooper et al. (1996) study on summer learning loss as supporting evidence for their proposed year-round education solution. The learning loss that occurs over extended breaks is a problem for students on both sides of the Atlantic, according to Davies and Kerry. Although summer breaks in England generally extend over only six to seven weeks, rather than the 10 weeks or more that are typical in the United States, "It is not uncommon for students in England to measure several months lower on standardized reading tests, for example, after the summer vacation than before it" (p. 362).

Cooper et al.'s 1996 study was based in practical considerations. As a researcher at the University of Missouri–Columbia, Cooper ran for and was elected to the local school board in

his hometown. Faced with congressionally proposed budget cuts, Cooper and the remaining members of the school board began to examine the feasibility of locally funding summer school opportunities for disadvantaged children. As the school board considered the cost-to-benefit ratio of the program, Cooper drew upon the resources of his colleagues at the university to assist him in gaining a global perspective of the educational benefits of summer programming. Thus, Cooper and his colleagues launched their investigation into the effect of summer vacation on student learning (Cooper, 2004).

Cooper et al. (1996) retrieved information from 39 studies, the earliest of which dated back to 1906, that examined the phenomenon of summer learning loss. Of those studies, 26 were conducted prior to 1975. The passage of 20 or more years between the original studies and that by Cooper and his colleagues called into question the relevance of those studies to students of the 1990s. Further, early studies (i.e., those conducted prior to 1975), provided little statistical information that could be suitably incorporated into a meta-analysis of the remaining 13 studies. Results of the meta-analysis yielded that overall, student achievement test scores declined by approximately one month; declines in math scores were more pronounced than in reading or language; math computation and spelling showed larger effects than other subject areas; students showed a loss of close to 2.6 months in math computation, without regard to socio-economic status; and reading comprehension scores declined for all income groups, but showed a greater decline for students with low socio-economic status (Cooper et al., 1996).

While the 1996 study by Cooper et al. primarily examined summer learning loss as a function of the school calendar, another group of researchers, Alexander et al. (2001) approached their study from a different perspective. In response to local Baltimore headlines decrying the

ineffectiveness of city schools in raising student achievement levels over time, these researchers from Johns Hopkins University noted:

That the out-of school social context directs children's academic development before they get to *real school* seems self-evident; yet the same life circumstances that undercut school readiness are ever present in young people's lives. The drag of poverty, family stress, and community decay doesn't suddenly turn off when children reach 6 and the school's influence begins to weigh in. This has implications for the social patterning of achievement differentials among school-age children just as it does among preschoolers: the achievement gap across social lines would be expected to widen over time for reasons having nothing at all to do with the schools. (p. 172)

According to Alexander et al. (2001) the school calendar, for those students who did not attend summer school, presented an unparalleled opportunity to examine the difference in student achievement over schooled and unschooled time frames, thus implicating the effectiveness of school programs over the impact of home influences. The study extended over five school years and four summers with the comparative growth recorded for each of the regular school years, as well as for each of the summers. Results of the study indicated the following:

1. Student learning was greater and more efficient during schooled versus unschooled times.
2. Verbal gains over the summer were greater than those for math, which supported the finding of Cooper et al. (1996) that declines in math scores were more pronounced than in reading or language.
3. The first two years of school show greater gains in student achievement levels than in later years.

4. During the school year, students of lower socio-economic status (SES) achieve at approximately the same level as their higher SES peers; however, when lower SES students do not participate in summer school, their achievement levels lag behind those of their higher SES peers over the summer.
5. Significant SES differences emerge only during the summer, they must be traced to sources outside school. (Alexander et al., 2001, p. 181)

Thus, Alexander et al. (2001) concluded:

Recognition of the power of schools to make a difference in the lives of poor students needs to be coupled with efforts to involve parents and communities in the schooling process so that all parents, not just middle-class parents, are active collaborators in the education of their children. The physical possessions of better off families—computers, books and the like—may be of some importance in producing the summer advantage, but probably more important is that parents view themselves as partners in the learning process and possess the psychological resources that support learning. (p. 185)

Burkam et al. (2004) drew from nationally representative data from the Early Childhood Longitudinal Study—Kindergarten Cohort to examine whether there was a disparity in summer learning based on SES, and whether such disparity resulted from a difference in participation rates in summer programs. Recognizing the limitation of their research to only one particular summer interval (that between kindergarten and first grade), the researchers' findings were consistent with prior findings that “summer learning is related to social background” (p. 22).

Their findings, however, also indicated that the relationship between summer learning and SES was not linear; rather, the differences in summer learning were concentrated in the highest and lowest SES quintiles. Further, the researchers found that the differences in summer

learning levels were not explained by SES-related discrepancies in children's non-summer-school related activities.

Although children who engage in a few of these activities do learn slightly more over the summer, the magnitudes of the SES effects on summer learning remain nearly constant even when out-of-school educational activities are taken into account. Either parents' reports of activities are unreliable, the particular items that were asked in the ECLS-K parent questionnaires were incomplete or not well designed, or the frequency of these activities simply do not influence summer learning as measured by these tests. (Burkam et al., 2004, p. 22)

Phillips and Chin (2004) undertook an analysis of data from a sample of 1,141 first graders from the U.S. Department of Education's *Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity* (Buron, Beecroft, Bell, Price, & Gemmen, 1998). The purpose of the study was to examine the impact of Chapter 1 funding on student achievement; therefore, not all data was applicable to the examination of summer learning. The sample data examined by Phillips and Chin, however, included scores on the Comprehensive Tests of Basic Skills (CTBS) at three time points, demographic information, and information gathered through surveys of teachers, as well as results of surveys completed by parents.

Results of the study (Phillips & Chin, 2004) that compared children with the same academic and social skills in the spring showed that children of lower SES experienced greater summer learning losses in most subject areas than higher SES children. Further, when African-American and White children with the same academic and social skills in the spring were compared, the African-American children gained less than their White counterparts in reading

comprehension and math concepts and applications, but not in math computation or reading vocabulary.

The study by Phillips and Chin (2004) also noted that even small amounts of academic practice over the summer months seem to improve students' skills.

Both teachers and parents play a role in encouraging learning over the summer. In our analysis, teachers who assign projects that build on reading, writing, and research skills seem to have a small but lasting effect on children's learning over the summer, independent of family background and parenting practices. Students whose teachers assign more projects over the school year seem to gain more over the summer in all subjects, which suggests that these teachers give students better tools to integrate their academic knowledge and experiences into activities (perhaps drawing, building models, putting on plays, etc.) that are not strictly academic. Assigning, presenting, and working on these projects may also be a way for teachers to keep parents informed about what their children are doing in class and what types of *fun* academics parents can do with the children over the summer. (p. 276)

Other indications from the study were that children improve verbal skills over the summer when they read or when their parents read to them. Math scores may improve over the summer by incorporating math into children's everyday activities. Parents may gain the skills and confidence necessary to foster their children's math skills if they observe how teachers teach math in the regular classroom. That is, they may develop a better understanding of how to use manipulatives, practice math facts, and reinforce skills and concepts that the child has already mastered. Parents should be encouraged to observe classrooms at least once or twice during the course of the regular school year. Teachers should inform parents of their child's progress, but

also include information about what the class is studying, as well as tips to help their child practice at home the skills learned in the classroom. Providing incentives for teachers to send home shortened, activity-based curriculum materials with students on the last day of school may be a low-cost approach to prevent or reduce the summer slide (Phillips & Chin, 2004).

Impact of Summer School on Summer Learning Loss

Three strategies most frequently utilized to offset summer learning loss are extending the school year, modifying the school calendar to dispense with the extended summer break, or offering summer school programs. Extending the school year may simply be a lengthening of either the number of instructional days or the amount of time in each school day to ensure that instruction is continuous. However, this raises the question of the optimum number of days or hours to yield the greatest cost-to-benefits ratio. One negative aspect of this approach would be the effect on school budgets, primarily associated with staff salaries. A second, perhaps more important aspect involves the intentionality of instruction, whereby there is no change in instructional practices, strategies, or differentiation from the rest of the school year. If teachers have not engaged in differentiation or individual student intervention plans during the traditional school year, merely extending instructional time does not guarantee increased student understanding.

Modifying the school calendar differs from extending the school year because there is no change in the total amount of time spent in school. Rather, there is a shift in the scheduling of instructional sessions and intersession breaks. While this option does eliminate the extended summer vacation, it incurs an increased financial burden for the school system that provides intersession learning opportunities, and creates logistical ramifications that may preclude implementation.

Summer school has been the most frequently utilized option as it was designed specifically to align with the traditional school calendar. By nature, summer school reduces the number of students involved, thus reducing the number of staff members and associated resources required for implementation. Summer school has been considered a viable option, not only because it has been shown to reduce summer learning loss, but because there may be students who fall behind in the regular school year who may benefit from an alternative, more individualized instructional approach.

Although the meta-analysis by Cooper et al. (1996) presented no definitive conclusions as to the potential effectiveness of modifying the current school calendar, the researchers did make recommendations for optimizing the effectiveness of summer programming, based upon their findings. For schools with limited programming options or limited resources that intended to address the needs of the general student population, summer schools would best serve those students by focusing on math instruction. If, instead, “programs have the explicit purpose of mitigating inequities across income groups, then a focus on summer reading instruction for lower-income students would seem to be the most beneficial” (p. 263).

Cooper et al. (2000) undertook a more extensive research project than that in 1996, this time focusing on the impact of summer school on summer learning loss. The results of 93 program evaluations were included in the study that included both meta-analytic and narrative procedures. Fifty-four of those program reports contained suitable information for inclusion in the researchers’ statistical analysis. Cooper et al. established a basis for examining the impact of summer school by first identifying the goals generally associated with summer programs. To summarize, they are:

1. Prevention of delinquent behaviors. After child labor laws were passed in 1916, students who were not in school had little to occupy their time. Organized recreational and learning activities offered students positive alternatives to delinquent behaviors. Although this is not an overt function in today's summer schools, it remains a latent function.
2. Remediation or prevention of learning deficits (including summer learning loss) by assisting students in their efforts to meet minimum competency standards or providing an opportunity for students to re-take failed classes;
3. Provision of learning opportunities for elementary students in danger of retention at the same grade level for a second year;
4. Insuring that students with disabilities receive a free and appropriate education in keeping with the Individuals with Disabilities Act;
5. Provision of extended-time activities for disadvantaged youth;
6. Provision of enrichment activities programs to enhance learning for gifted students;
and
7. Provision of opportunities for teachers to supplement their salaries and develop their professional competencies. (Cooper et al., 2000)

Findings of the study by Cooper et al. (2000) reflected outcomes as they related to program goals:

1. Summer school programs that focused on lessening or removing learning deficiencies have a positive impact on the knowledge skills of participants. Overall, students completing remedial summer programs can be expected to score about one fifth of a

- standard deviation, or between one seventh and one quarter of a standard deviation, higher than the control group on outcome measures. (p. 89)
2. Summer school programs focusing on acceleration of learning or on other or multiple goals also have a positive impact on participants roughly equal to programs focusing on remediation. (p. 91)
 3. Summer programs have more positive effects on the achievement of middle-class students than on students from disadvantaged backgrounds. (p. 91)
 4. Remedial summer programs have larger positive effects when the program is run for a small number of schools or classes or in a small community. (p. 92)
 5. Summer programs that provide small group or individual instruction produce the largest impact on student outcomes. (p. 92)

Although the following statements cannot be made with the same level of confidence as the aforementioned conclusions, the Cooper et al. (2000) drew these inferences based on the study:

1. Required parental involvement in summer programs produced larger effects than for programs without this component.
2. Remedial summer programs may have greater impact on math achievement than on reading.
3. The achievement advantage gained by summer school participants may diminish over time.
4. Remedial summer school programs have the greatest effects on students in early grades and those in secondary grades, although positive effects are seen for students at all grade levels.

5. Summer programs that are monitored to insure that instruction is being delivered as prescribed and where attendance is monitored may produce larger effects than unmonitored programs. (Cooper et al., 2000)

In his testimony to the U. S. Senate, Health, Education, Labor and Pensions Committee, Cooper (2002) summarized the results of the 2000 meta-analysis as:

Summer programs have a clear positive impact on the knowledge and skills of participants. The average student who goes to summer school jumps over about 5% to 10% of similar students who do not attend, as measured by achievement test scores. (p. 2)

Borman (2000) referred to Cooper et al.'s (2000) meta-analysis in stating, "summer school may be the primary intervention through which educators prevent the cumulative widening of the reading achievement gap" (p. 124).

According to Cooper (2001) prior research carried important implications for both policy makers and summer school program administrators. Policy makers were urged to: (a) continue funding summer school programs, (b) require that most of that funding be allocated for instruction in math and reading, (c) provide adequate funding for transportation for summer programs and food service at program sites, (d) allow local control of program delivery such that programs could be specifically targeted to meet the academic needs of program participants, and (e) require rigorous formative and summative program evaluation. Cooper encouraged program administrators to optimize the potential effectiveness of summer school by planning early to facilitate transition from regular school sessions to summer learning activities, providing continuity in staffing and programs, and evaluating program effectiveness.

The Southern Regional Education Board (SREB), in January 2001, released a report on social promotion and retention rates (Denton, 2001). As neither of these practices contributes to

long-term student success and may actually increase the potential for long-term failure, schools must seek effective options for meeting the academic needs of their students. Several options were suggested for identifying specific needs of students and targeting instruction as early and consistently as possible throughout the course of the school year. If efforts during the regular school sessions are not adequate in helping students meet grade-level standards, summer school becomes the recommended option. While summer school programs may differ considerably between and among districts, the report advised:

The most critical factor in making summer school useful is making it *different*. A crash course that uses the same materials and methods that previously did not work for students is unlikely to produce the desired gains in student performance. (p. 15)

Denton (2001) also reported that the successful summer program will be one where instructional methods and materials are matched to the needs of the student, and teachers are recruited and assigned on the basis of those needs. Merely attending summer school does not ensure academic success for program participants. As such, parents, teachers, or students should not view summer school as an end, but as a means to an end. It is a stepping-stone to ongoing, targeted instruction in the year following the program to avoid losing the ground that students have gained over the summer.

In another report, Denton (2002b) reiterated features of effective summer programs that achieve the greatest positive results. Such a summer school:

- is an integral part of a year-round program of extra time and extra help;
- is available to all failing students at no cost to parents;
- meets clear standards for quality, program length and scheduling of classes;

- responds to individual needs through the use of innovative and creative teaching strategies;
- puts priority on student mastery of reading and math skills;
- employs teachers who have special training and/or proven ability to help struggling students; and
- rigorously evaluates teaching strategies and student achievement. (p. 1)

The report also suggested that summer programs realize less than their full potential for enhancing student achievement when they are not well planned and when they are conducted in isolation from the regular instructional program. Remarkable disparities exist among summer program scheduling options regarding both length of time in days or weeks and length of time within each instructional day. SREB findings indicated that the most effective programs operate for a portion of each day over an extended period of weeks, thereby minimizing time gaps in the instructional process.

As Christie (2003) reviewed the 2002 SREB report, she cautioned educators that there is a need to distinguish between students who cannot meet grade level expectations and those who choose not to meet those expectations or do not apply the skills that they possess. She reminded, “Extended instructional time should not be a threat to hold over the heads of students who are disengaged from their teachers” (p. 487). Instead, summer and extended programs need to offer engaging curriculum taught by innovative teachers who challenge their students to raise their levels of performance, much as a coach might encourage “academic athletes” (p. 487).

Ron Fairchild, executive director of Johns Hopkins University Center for Summer Learning, was quoted as describing summer school as an “untapped resource” (as cited in

Black, 2005, p. 40). Many schools reactively offer remedial summer sessions, yet few proactively utilize summer school to avoid summer learning loss or prevent the development of summertime achievement gaps.

Matthew Boulay, founder of the Teach Baltimore Summer Academy, recognized the tremendous potential that effective summer programs, such as his, have for reducing summer learning loss for economically disadvantaged children. Boulay joined Fairchild in noting that the greatest advantage of such programs is to provide additional learning time for those students who need it the most (as cited in Black, 2005).

Prior to Black's (2005) article, Boulay and Fairchild (2002) collaborated in creating a brochure for parents about making the most of summer vacation for their students. The authors clearly and concisely introduced parents to the concept of summer learning loss, and followed with practical suggestions for family activities to support learning over the extended summer break. Tips for supporting reading and writing skills included ideas such as subscribing to magazines or newspapers, discussing current events with one's children, and visiting the local public library regularly throughout the summer. Math and science suggestions included activities such as cooking and baking to practice measuring and fractions, tracking and predicting weather patterns and temperatures, gardening, and recycling. For social studies support, parents were encouraged to take field trips to museums, zoos, historical sites, and other sites of local significance. For parents interested in formal summer programs, Boulay and Fairchild offered a checklist of questions parents should ask themselves to assist in summer program selection:

1. Does the program give my child daily opportunities to read and write?
2. Do instructors teach academic subjects or focus solely on recreation?

3. Will my child receive individual attention and be a part of small classes?
4. Do staff members monitor student attendance and provide structured learning activities?
5. How does the program involve parents? (p. 5)

Borman, Benson, and Overman (2005) undertook a study to examine more closely the role of families and summer school programs in influencing summer learning. The study focused on students in the Teach Baltimore program, founded by Matthew Boulay, as compared with students who did not attend. Results of the study suggested that high-poverty students who did not attend summer programs experienced summer learning losses; however, differences in SES among students' families were not associated with differences in summer learning levels. It was unclear whether the degree of differences among family backgrounds was small enough as to be a negligible influence, or whether neighborhood poverty played a more important role in influencing summer learning. This suggested that researchers prior to this study "may have underestimated the importance of neighborhood context when focusing most of their attention on family-based SES inequalities in summer learning" (p. 146).

Findings of the study by Borman et al. (2005) suggested that voluntary programs specifically targeted to reduce summer learning loss positively impact student learning for those students whose parents made program participation a priority. The success of the program was dependent upon parental commitment and the rigor of the program itself. Neither parents nor programs in isolation were effective in preventing summer learning loss. Instead, the findings indicated that "children need both the structured learning opportunities and resources offered through a formal school-based setting and the commitment of parents to make sure that they attend and get the most out of the program" (p. 149).

Borman, Dowling, Fairchild, Boulay, and Kaplan (2006) published the results of a three-year study investigating the effects of a multi-year summer school program in offsetting the cumulative effect of summer learning losses for students from high-poverty schools. This study provided a longitudinal perspective of the 2005 study by Borman et al. of students in the Teach Baltimore summer program. Results of the 2006 study were consistent with those published in 2005, indicating that high-poverty students who did not attend summer programs experienced summer learning losses. Further, the findings of 2006 mirrored those from 2005 that indicated that family-based differences among high-poverty students were not associated with differences in summer learning levels.

Findings from the longitudinal study by Borman et al. (2006) showed that a voluntary summer program designed with the goal of minimizing summer learning loss could positively impact students' longitudinal learning outcomes if students attend the program regularly. Again, this finding underscores the importance of parental commitment to ensuring that students consistently attend the summer sessions for which they are registered, even when attendance is not strictly mandated.

Impact of Gender and Ethnicity on Summer Learning Loss

While no studies were found that exclusively examined the impact of gender on summer learning loss, Cooper et al. (1996) investigated the impact of both gender and race as part of their meta-analysis. According to their findings, "Neither student gender nor student race appeared to have a consistent moderating influence on the effect of summer vacation" (p. 262).

Similarly, Alexander et al. (2001) found no significant influence of gender on summer learning. They noted, "But the seasonal adjustment has its greatest effect on the size and

patterning of SES differences, with achievement disparities larger altogether across socioeconomic lines than across racial/ethnic and gender lines” (p. 181).

Phillips and Chin (2004), however, did identify a difference in learning between the genders:

When we compare first-grade boys and girls with the same social and academic skills, social class, family structure, and family practices, the boys learn more math skills over the summer than do girls. This widening gender gap in math skills may be an early cause of gender differences in math skills among older children and indicates that boys’ summer environments facilitate the development of math skills in ways that the Prospects data do not capture. (pp. 270–271)

Measuring Student Achievement

For better or worse, student performance on standardized tests has become the measure by which schools and districts demonstrate accountability. In response to federal mandates of No Child Left Behind legislation and state mandates of Public Law 221, the state of Indiana has selected Indiana Statewide Testing for Educational Progress Plus (ISTEP+) as the measure of achievement for students in third through ninth grades. The test is designed to serve as an indicator of student proficiency in meeting grade level standards in math and English/language arts, but provides only an annual snapshot of student performance as it is administered only once each year.

For the purpose of this study, student achievement was measured using scores on the standardized NWEA MAP. All students in grades 2 through 10 in the district under consideration have participated in NWEA MAP testing in the fall and the spring of each school

calendar year since 2002-2003. The selection of this assessment method finds support in the writings of Borman (2000):

Studies of seasonal learning differences are vital for advancing the child development and educational equality fields, but because these studies require that we assess students twice a year (once during the fall and once during the spring), they are expensive and they place additional burdens on schools and students. Testing students once a year, though, is largely a waste of resources because it is impossible to disentangle summer and school-year differences in children's cognitive development. (p. 125)

NWEA Measures of Academic Progress consist of a series of computer adaptive assessments that measure students' general knowledge in reading, language usage, and math. The tests are not timed. Versions of NWEA tests in use in districts throughout Indiana have been specifically aligned to the content of the Indiana State Standards (Cronin & Bowe, 2005). Further, NWEA has conducted a series of studies in 2003, 2004, and 2005, to align scoring between its tests and state-mandated assessments, such as ISTEP+. Scores from MAP assessments were first shown to correlate closely with ISTEP+ scores in 2003, with Pearson coefficients ranging from .72 to .88 depending on grade and subject. In general, correlations for grades 6 and 8 were reported to be higher than those for grade 3 (Cronin, 2003). In 2004, NWEA estimated the alignment with ISTEP+ cut scores for those grade levels added to the ISTEP+ testing process. Through their studies in 2005, NWEA researchers developed estimates of fall and spring performance levels that would allow educators to predict the success of students on ISTEP+ (Cronin & Bowe, 2005).

All NWEA test results are reported using the RIT scale to describe student achievement and growth. The RIT score is an equal-interval score that directly relates to the curriculum scale

in each subject, rather than having a basis in the performance level of specified student groups. As such, these scores can be added together to calculate accurate class or school averages. RIT scores generally range from approximately 150 to 300, and are stable, direct indicators of student achievement. As the tests are administered twice a year in consecutive years, educators can gain a perspective on student growth, as well as on discrete levels of student performance (NWEA, 2001a).

In 2001, the Northwest Evaluation Association developed the Learning Continuum as a supplemental tool for guiding instruction based upon student RIT scores. The Learning Continuum was developed through a process which included the examination of the NWEA test bank in language usage, math, and reading to identify the skills and concepts assessed, the level of difficulty of test items, and new vocabulary and/or symbols. Each subject was broken down into goal strands that were commonly associated with state standards or other curricular materials, and those were further broken down into ten point RIT bands. The skills and concepts listed at the RIT ranges below a student's RIT score for a particular subject were those that the child would be expected to have mastered (NWEA, 2001b).

By 2006, NWEA updated the Learning Continuum, changing the name to *Des Cartes: A Continuum for Learning*. This instructional tool describes skills and concepts to enhance, develop, or introduce according to goal strands associated with each subject (reading, language usage, and math), based upon student RIT scores (NWEA, 2006).

In 2002 and again in 2005, NWEA completed norming studies to describe student achievement status along the RIT scale. These studies allow educators to compare performance of students within a class or grade level to that of other schools across the nation. The results included in the 2005 NWEA study were from more than 2.3 million students in 794 school

districts, representing 32 states. Mean achievement levels (shown as RIT scores) for students in grades 2–5 (the grade levels included in this study) involved in those studies are shown in Tables 1 and 2.

Table 1

NWEA Mean RIT Scores for Grades 2-5 (2002)

Grade	Language Usage		Reading		Math	
	Fall	Spring	Fall	Spring	Fall	Spring
2	180.0	189.0	177.7	186.6	177.6	188.2
3	191.6	199.0	188.7	197.2	189.7	199.7
4	200.9	205.5	198.0	204.3	200.4	208.6
5	207.3	211.5	205.2	210.3	208.9	216.4

Note. NWEA, 2002, p. 2

Table 2

NWEA Mean RIT Scores for Grades 2-5 (2005)

Grade	Language Usage		Reading		Math	
	Fall	Spring	Fall	Spring	Fall	Spring
2	179.7	191.4	177.2	188.2	179.3	190.6
3	193.1	200.8	190.3	197.9	192.3	201.7
4	201.7	207.1	199.1	205.0	202.7	210.4
5	208.2	212.5	205.8	210.6	211.2	218.3

Note. NWEA, 2005, p. 2

According to NWEA (2002), “The RIT scores and mean growth values should be considered typical or indicative of student performance at each grade level. They should not be considered as long-term goals, stopping points, or expectations” (p. 1).

Interestingly, there is no evidence of a global regression from spring to fall in these data, as reported by NWEA. These anticipated performance values are included for reference purposes only, and will not be used as measures of success within this study. That is, the study will not include a comparative analysis of actual student RIT scores relative to anticipated scores; rather, it will focus on changes in actual student performance on two administrations of the NWEA MAP tests, from spring to fall for each year of the study.

Summer School Programs that Work

While educational leaders share a common goal of providing instructionally sound, quality summer programming to students, they also share responsibility for operating such programs within the budgetary constraints allotted to them. According to the study of summer school programs in South Carolina by Monrad and May (2001), educational leaders most frequently indicated the need to expand their summer schools in at least one of three ways to improve program effectiveness: length of instructional day, total number of days of the summer program, and provision of services for students in grades K-2. The next most frequently cited needs for summer programs included funding for (a) reduction of student-teacher ratios, (b) recruitment of qualified teachers, (c) appropriate pre- and post-testing instruments, (d) curriculum materials with demonstrated effectiveness, (e) transportation, and (f) professional development.

As school districts across the nation seek to increase the effectiveness of summer programs, policy-makers at federal, state, and local levels will be called upon to examine

avenues for providing adequate funding to facilitate those programs (Monrad & May, 2001). This sentiment was echoed by Denton (2002a) in his statement, “Summer school must be an integral part of the overall educational program and must not disappear every time the economy falters” (p. 2).

The stark reality is, however, that budget cuts have resulted in dramatic reductions in or elimination of summer programming in school districts from South Carolina to New York City (Denton, 2002a). Such cuts have forced educators to re-examine their approaches to summer school, while still addressing the needs of students most at risk for academic failure or decline.

Examples included:

1. Johnston County, North Carolina, where the district negotiated contracts with each summer school student and his/her parents. Summer school was provided at no cost to students for those mandated to attend to avoid retention in their current grade level; however, academically successful students who voluntarily chose to attend the program were required to pay established fees. This program was recognized as an exemplary program by the SREB.
2. Miami-Dade County, Florida school district, where summer school was provided at no cost to all students. The district eliminated summer programs for students wishing to advance in their coursework. Instead, eligibility was restricted to students in danger of failing either required coursework or an entire grade level, students who scored at the lowest level on the Florida Comprehensive Assessment, or those identified by their teachers as being in need of summer school. Having found that students who do not attend regularly in the first few days of summer school typically did not attend enough of the summer session to be of benefit, the district suspended

summer school services to any student who did not attend at least one of the first two days of the summer session. This allowed funding and resources to be targeted toward those students committed to program participation.

3. Fairfax County, Virginia, where students are charged up to \$600.00 to attend summer school, with fees based upon a sliding scale for low income families. Despite the monetary investment required of students and their families, summer school enrollment increased by 15% between the summer sessions of 2001 and 2002. This increase was viewed as a response to a newly initiated conditional promotion policy whereby middle school students on the borderline between passing and failing could progress to the next grade level upon successful completion of the summer program in either language usage or math. The increase may also have stemmed from students recognizing the need for additional academic support for preparing for Virginia's Standards of Learning tests, given to all third through twelfth grade students.
4. Chicago Public Schools Summer Bridge program, which was recognized as exemplary by SREB. In 2002, the program served the largest number of students since its inception in 1996, with 60% of its participants improving their performance enough to move ahead to the next grade, despite higher promotion standards implemented in 2001-2002.
5. Virtual programs, available online in Alabama, Arkansas, Florida, and Kentucky, which operate year-round including the summer months, and provide opportunities for students who need help meeting graduation requirements, as well as for those who want or need extra credit or electives. In some cases the cost of these programs was

covered by the schools or districts, in others, costs were paid by students and their families (Denton, 2002a).

Kim (2004) undertook a study to investigate the impact of independent reading of books over summer vacation on reading achievement in the fall, as an alternative to more structured summer school programs. The study included Black, White, Latino, and Asian students of low and middle SES, and relied on data collected from student surveys administered in the first week of school after summer break. Measures of reading frequency were based only on responses wherein students were able to identify the actual title of the book they referenced. Findings indicated:

1. The number of books read over the summer was positively related to reading achievement in the fall independent of student background or prior reading and writing skill levels.
2. The impact of reading books over the summer was consistent across all ethnic groups.
3. Reading four to five books had significantly larger effects than reading three or fewer books.
4. Increasing access to books may have larger effects on the number of books read by Black children; however, these results were not definitively established.
5. Students who read books and fulfilled accountability requirements to teachers by writing about their books or obtaining parental signatures were predicted to read more books than those students who did not comply with accountability requirements. This suggests that accountability factors may be more effective than prizes and incentives in encouraging students to read over the summer (Kim, 2004).

Examples of schools that have implemented programs wherein teachers hold students accountable for reading and writing activities over the summer included:

1. Greenwich, Connecticut, where teachers mailed books to children during the summer months and students wrote about the books they read on postcards, which were then mailed back to the teachers.
2. Columbia, Missouri, where teachers surveyed students on topics of interest during the last week of school. Teachers then periodically mailed to students books on related topics, along with notes of encouragement. Students responded to each book by completing written activities, which they mailed back to their teachers. Through this program, students were given the opportunity to read between 12 and 14 books over the course of the summer (Kim, 2004).

Chicago's Summer Bridge Program is a highly prescribed and monitored program with a centrally developed curriculum that provides third and sixth grade students six weeks of instruction for three hours per day. Eighth-grade program participants attend summer school for seven weeks, four hours per day. Participation at those grade levels is mandatory for any student not passing the Iowa Test of Basic Skills (ITBS). The average student to teacher ratio within the program was 16:1 in 1999, allowing for individualized instruction. The curriculum is aligned with the ITBS content, and teachers are provided with daily lesson plans and all related materials. Compliance with program structure is closely monitored. Participants engage in retesting on the ITBS following completion of the summer program (Roderick et al., 2004).

Results of an analysis of the first three years of Chicago Summer Bridge program implementation indicated that the program had short-term positive impacts for students at all grade levels in both reading and math, with eighth graders showing more growth than third

graders. Further, the learning rate for program participants was greater than “that experienced by the same students during the regular school year” (Roderick et al., 2004, p. 88).

Based on research by Cooper et al. (2000), the greater growth of eighth graders over their younger counterparts was unanticipated. One explanation may be that the effects of the Summer Bridge Program may be driven more by instructional content than by age-related differences in program effects. Another explanation may be that eighth graders may have been more motivated than younger students to make adequate achievement gains as failure to do so would deny them entry into the high school program (Roderick et al., 2004).

Large program gains across grade levels may have been explained by the focus on test prep (for re-taking the ITBS), and may not have been indicative of mastery of reading and math fundamentals. An alternative explanation may have been that teachers were not distracted from their teaching by non-instructional tasks to the extent that they would have been during the regular school year. A third explanation may have been that teachers were particularly motivated or qualified, as identified by the principals who recruited them for the program (Roderick et al., 2004).

Stone, Engel, Nagaoka, and Roderick (2005) examined the Summer Bridge program from a different perspective: that of the students. Specifically, the researchers examined how Summer Bridge participants described the extent to which teachers set high academic expectations, as well as the extent of caring and support extended by teachers during both the summer program and the regular school year. Further, they examined how those perceptions varied by student demographics and performance characteristics. Results showed:

Over half of the 48 students in the qualitative sample characterized their experiences as substantively more positive in the summer than in the school year. These students

reported exposure to new content, increased attention from their teachers, and a learning environment geared to ensuring that all students mastered material. About a third of the sample (35%) characterized the summer program as similar in content and structure to that of the school year. Notably, only a small proportion of students indicated that their learning experiences in the summer were negative. These findings indicate that concerns raised about the nature of learning in mandatory, high-stakes programs like Summer Bridge may be unwarranted. Rather, it seems that the small class size, standardized curriculum, and relatively uniform ability levels of these classrooms are well matched to low-performing students' needs. (p. 952)

Results of the study also showed that eighth graders were more likely than younger students to feel differently about their Summer Bridge experiences as compared with those of the regular school year. Students who described positive summer school experiences, on average, experienced substantial academic gains through the program (Stone et al., 2005).

Summer school for Boston Public Schools (BPS) is an integral part of a transition services program, which spans as much as fifteen months for students at risk of academic failure in grades 3, 6, and 9, grades considered to represent important transitions in a student's academic career. Portz (2004) found that the school system operates under the ideology that:

Students should not be promoted from these grades unless they can read grade-level text, communicate their understandings in writing, and master grade-level content. Promotion standards were established for each grade with specific benchmarks on standardized tests, such as the Scholastic Reading Inventory, department-generated tests, and, in some instances, course grades. (p. 106)

According to Portz (2004), the BPS Transition Program is comprised of two elements, one implemented during the school year, and one implemented in the summer sessions before and/or after the school year intervention. The summer session is required for all students who do not meet promotion requirements in grades 2, 3, 5, 6, 8, and 9, and focuses on language arts and math in a small class setting. Students who do not meet promotion requirements after the summer session after grades 2, 5, or 8 move into school-year transition services in grades 3, 6, or 9. School-year transition services are characterized by small class size, opportunities for individualized instruction, additional instructional time, targeted instruction, and before- or after-school learning opportunities. Students not meeting promotional standards at the end of the school year are required to attend a second transition summer session. Those who still do not meet promotional standards at the end of the second summer are retained in the transition services at their current grade level, three, six, or nine. Beginning in 2000, the summer program operated four hours per day, four days per week for five weeks (Portz, 2004).

An analysis of the results of the BPS Transition Program (Portz, 2004) showed improvement in reading achievement for students at all grade levels after the initial summer session. Similar results were reported for math. Students who completed the summer session were more likely to be promoted to the next grade than their counterparts who were recommended for summer school, but declined the opportunity to attend. Educators used the summer session to help students raise their levels of academic performance, as well as to identify students who were in need of transition services in the following grades.

Unlike the highly prescribed curriculum of the Chicago Bridge Program, the Boston Public Schools Transition Program allowed a great deal of flexibility for staff members developing their summer curriculum during the first summer session. Although learning

objectives were defined by central office personnel, teachers were allowed to develop their own programs to meet those objectives. Experienced teachers with access to grade-level appropriate materials and resources viewed this flexibility as a positive opportunity to develop highly individualized instructional plans. Teachers with little experience at the summer school grade level were less able to structure their instructional plans. As Portz (2004) noted:

This challenge is a classic centralization-decentralization issue that is common to large school districts. How school districts meet this challenge often depends on the practices and traditions of that district. In Boston, for example, flexibility in curriculum design is common at the school level. The school district and the state have learning standards and curriculum frameworks for each grade and subject, but individual schools in Boston are encouraged to adopt a curriculum approach that is supported by school-level teachers and administrators. In this model of whole-school reform, schools have adopted different curriculum packages, particularly in the area of literacy. The summer approach, then, is consistent with the district practices during the school year. Although maintaining some local flexibility, preparations for summer school in 2001 included a review of this approach and the development of a more structured format for curriculum in summer classes. (p. 113)

During the first summer of implementation, 80% of summer school teachers relied upon curricular materials from the school year as materials ordered for the summer session did not arrive in time for the beginning of the program. While this situation did nothing to enhance the effectiveness of the summer 2000 program, it did underscore the need for timeliness in planning for future years. Two other lessons learned from the 2000 summer program included the need for staff members to engage in appropriate professional development and the need to encourage a

higher rate of attendance and participation by students. By summer 2001, professional development was scheduled during the regular school year as a cost containment measure and more communication was initiated between school and home. As a result of these changes, the percent of summer school attendees who met the reading benchmark at the end of the 2001 session was 46%, as opposed to 45% in 2000. In math, 54% of students who had not passed at the end of the school year did so at the end of the summer session. By comparison, that rate in 2000 was only 41% (Portz, 2004).

Paris et al. (2004) examined summer reading programs across the state of Michigan for their effectiveness in helping students in grades K-3 develop the skills necessary to read at grade level. No single approach was either implemented or tested, which allowed researchers to identify characteristics of successful programs, as well as procedures for evaluating literacy program success. Results of the reading performance measures for all sites indicated that summer school students at all sites significantly increased their reading accuracy, retelling, and comprehension scores. The effects did not differ by gender, although there were greater effects for younger children and those who were initially poorer readers. As part of the study, researchers identified the following features of successful summer programs:

- A minimum of 60 hours of reading instruction.
- Daily opportunities to read both easy and challenging materials.
- Daily opportunities to write authentic texts.
- Direct instruction on phonological awareness as needed.
- Direct instruction on strategies for word-reading, comprehension, and writing.
- Motivating activities to engage students in using literacy for learning. (p. 127)

As a result of their investigation, Paris et al. (2004) made the following recommendations:

1. Avoid the use of control-group evaluation designs that would prevent students who might benefit from summer school from participating in the program.
2. Select high quality pre- and post tests.
3. Whenever possible, use surveys to gain insight from participants, parents, and staff members involved in the program.
4. Provide adequate resources for program evaluation.
5. Staff the summer program with qualified, experienced teachers.
6. Provide opportunities for individualized instruction.
7. Coordinate summer programs with those of the regular school year, and whenever possible, utilize staff from the regular school year.
8. Increase the length of time for summer school to at least 60 hours of instruction.
9. Communicate clearly with parents to engage them in the learning process and ensure regular program attendance by students.
10. Provide adequate funding to support summer programming. (Paris et al., 2004)

In their efforts to identify what types of programs are most effective for preventing summer learning loss, Roberts and Nowakowski (2004) examined the impact of the Voyager TimeWarp™ program. The goal of the research-based program is to prevent summer learning loss and close the achievement gap in a total of 80 hours of instruction during the summer. Key components of the program include the following:

1. a restructured classroom that promotes collaborative learning;
2. redefined roles for teachers as co-learners, guides, coaches, and mentors;
3. assessment and evaluation used as diagnostic tools to facilitate a personalized approach to learning;

4. continuous staff development focusing on standards of authentic instruction
5. current, interdisciplinary, research-based curricula that are relevant, discovery-based, and focused on critical thinking;
6. curricula aligned with state standards and targeted to reinforce skills based on the results of state and national assessments; and
7. programs that develop students' leadership skills and promote collaboration that prepares them for citizenship and the real world. (p. 167)

Teacher training by Voyager personnel is mandatory, and prepares summer school instructors for a typical TimeWarp™ day, which includes:

1. Teacher-directed whole group instruction;
2. Rotation through three learning stations by student teams grouped by reading levels with each team having a student team leader, thus allowing teachers to engage in individualized instruction;
3. Activities designed to allow students to reflect on what they have read through creative writing or other theme-related projects;
4. Review of what was learned and encouragement to share that information with parents (Roberts & Nowakowski, 2004).

Results of the Roberts and Nowakowski (2004) study showed that TimeWarp™ had a considerable effect on the reading levels of students in programs across the United States during the summer of 2000. The effect was in the upper quartile of program effects described by Cooper et al. (2000), and appeared to be stable across TimeWarp™ sites.

Weiss (2006) recognized that each summer school program has individual needs and differing components; however, program administrators should consider the following themes as

they look to develop and refine effective, high-quality programs that meet the needs of the student populations they serve: (a) relationships and partnerships, including those between teachers and students, schools and community, and among parents, teachers, and students; (b) student engagement, which results in regular attendance and focused attentive participation in program activities; and (c) intentionality of planning, implementation, outcomes, and evaluation of the program, which allows educational practitioners to optimize the benefits for their unique clientele.

Summary

The traditional nine-month school calendar has long been associated with an agrarian culture; however, a review of the educational system over the years indicates that the current calendar is not simply a result of educators and policy-makers clinging to vestiges of archaic and outmoded habits and traditions. Rather, the school calendar has evolved over the years to adapt to the demands of the communities and regions that it affects. Although the calendar may not be perfect, it allows a degree of flexibility for various regions, while maintaining a level of uniformity and consistency of expectations and services for students in a highly mobile, ever-changing nation.

One of the greatest problems associated with the nine-month school calendar is the learning loss associated with long periods of vacation from school. Overall, scores on achievement tests can be expected to decline by approximately one month over the course of the summer, with math computation and spelling being most negatively impacted. Reading comprehension scores decline for all income groups, but show a greater decline for students with low SES (Cooper et al., 1996). Neither gender nor ethnicity has been shown to have a significant relationship to summer learning loss.

To avoid summer learning loss, school districts have considered three main alternatives to the traditional school calendar: extending the school year, modifying the school calendar to dispense with the extended summer break, or offering summer school programs. In many cases, summer school is the most cost-effective means of delivering additional services to students. Summer school programs have been shown to have a positive impact on student learning when they are appropriately focused. They have more positive effects on the achievement of middle-class students than on students from disadvantaged backgrounds, and have larger positive effects when the programs are run for a small number of schools or classes. Summer programs that provide small group or individual instruction produce the largest impact on student outcomes (Cooper et al., 2000).

Summer programs that achieve the greatest positive results share certain characteristics.

Such a summer school:

- is an integral part of a year-round program of extra time and extra help;
- is available to all failing students at no cost to parents;
- meets clear standards for quality, program length and scheduling of classes;
- responds to individual needs through the use of innovative and creative teaching strategies;
- puts priority on student mastery of reading and math skills;
- employs teachers who have special training and/or proven ability to help struggling students; and
- rigorously evaluates teaching strategies and student achievement. (Denton, 2002b, p.

1)

Additionally, summer programs were shown to be more effective when parents are active supporters and ensured that students attended summer school regularly.

In order to ascertain the effectiveness of the summer program in impacting student achievement, it is imperative to use high-quality pre- and post-testing measures. The NWEA provides one such option for evaluating student achievement. By comparing spring NWEA results to fall NWEA results, educators can gain insight into the level of learning that has occurred between test administrations.

There are many approaches to summer school implementation, ranging from locally developed programs to highly prescribed, commercially developed systems. The effectiveness of any of these systems, however, can be enhanced by (a) building relationships among teachers, students, parents, and the community; (b) engaging students so that they are active participants who attend regularly; and (c) planning, implementing, establishing outcomes, and evaluating programs with intentionality (Weiss, 2006).

As long as schools continue to operate on the traditional nine-month calendar, educators must rise to the challenge of providing meaningful summer programming options, or as Denton (2002a) so succinctly noted:

Research clearly shows that quality summer programs for struggling students are essential to closing the gaps, and any school that does not offer such programs essentially gives up on some students. Summers without meaningful learning doom some students to failure. (p. 12)

CHAPTER 3

Methodology

A review of recent literature indicated that one of the greatest problems associated with the nine-month school calendar is the learning loss associated with long periods of vacation from school. Studies have shown that overall scores on achievement tests can be expected to decline by approximately one month over the course of the summer, with math computation and spelling being most negatively impacted. Reading comprehension scores decline for all income groups, but show a greater decline for students with low SES (Cooper et al., 1996). Neither gender nor ethnicity has been shown to have a significant relationship to summer learning loss.

To avoid summer learning loss, many school systems have implemented summer school programs as a cost-effective means of delivering additional services to students. Summer school programs have been shown to have a positive impact on student learning when they are appropriately focused and structured (Cooper et al., 2000). However Cooper (2001) cautioned that it could not be assumed that all summer school programs are effective in minimizing summer learning loss or in increasing student performance levels. Cooper further challenged, ...the existence of summer learning loss cannot *ipso facto* be taken to mean summer educational programs will be effective remedial interventions. Summer school might not change the educational trajectory of students who took part in such programs. The impact of summer educational programs has to be evaluated on its own merits. (p. 3)

In order to ascertain the effectiveness of the summer program impact on student achievement, it is imperative to use high-quality pre- and post-testing measures. The NWEA provides one such option for evaluating student achievement. By comparing spring NWEA results to fall NWEA results, educators can gain insight into the level of learning that has occurred between test administrations.

The purpose of this quantitative study was to better understand the effects of a single-year summer school remediation program on elementary student achievement over a period of five years of program implementation. The study arose in response to practical concerns similar to those confronting many school districts across the nation: Is a non-scripted summer remediation program effective in positively influencing student achievement in reading, language usage, and math for students in grades 2–5? Further, do gender, SES, and ethnicity play roles in the effectiveness of the summer school remediation program?

For each year of this study, student achievement levels were operationally defined as the difference in student RIT scores between respective spring and fall NWEA MAP administrations in reading, language usage, and math for second through fifth grade summer school participants and their matched-pair counterparts. The study compared these differences for five years, beginning in the summer of 2003.

Research Question

After controlling for gender, SES, and ethnicity, is there a significant difference in student achievement in reading, language usage, and math for second through fifth graders based upon participation in a summer remediation program?

Null Hypotheses

H₀1: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for second graders based upon participation in a summer remediation program.

H₀2: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for second graders based upon participation in a summer remediation program.

H₀3: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for second graders based upon participation in a summer remediation program.

H₀4: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for third graders based upon participation in a summer remediation program.

H₀5: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for third graders based upon participation in a summer remediation program.

H₀6: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for third graders based upon participation in a summer remediation program.

H₀7: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fourth graders based upon participation in a summer remediation program.

H₀8: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fourth graders based upon participation in a summer remediation program.

H₀9: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fourth graders based upon participation in a summer remediation program.

H₀10: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fifth graders based upon participation in a summer remediation program.

H₀11: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fifth graders based upon participation in a summer remediation program.

H₀12: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fifth graders based upon participation in a summer remediation program.

Participants

Study participants were convenience samples of summer school students and their non-summer school counterparts in grades 2–5 from multiple elementary school sites within a single school district, East Allen County Schools (EACS), in northeast Indiana. To compensate for the lack of randomness, students in the experimental groups (summer school participants) were matched with their control group counterparts (non-summer school participants) who performed at the same RIT score level in each particular subject area (reading, language usage, or math) on the spring administration of the NWEA MAP for each year under investigation. Permission was

secured through the EACS Office of the Superintendent (Appendix A) to conduct the five-year study on summer school and non-summer school students. Achievement data and related demographic data were made available to the researcher according to student identification numbers to ensure the anonymity of participants in the study.

Only summer school participants with both spring and fall NWEA MAP test scores for a given year were included in the study, and those students were matched only to students who will also had taken both spring and fall NWEA MAP subject tests for the given year. That is, any summer school student with spring NWEA MAP scores who completed the entire summer school session, but moved away from the district prior to the fall NWEA MAP administration, was not included in the study. Similarly, any control-group student with spring NWEA MAP scores who moved away from the district prior to the fall NWEA MAP administration was not included in the study. Further, no student without valid spring NWEA test scores for the given year was included in the study.

Inconsistent attendance and high dropout rates have been longstanding problems reported by teachers during EACS voluntary summer remediation sessions. Prior to the summer of 2003, district-wide figures indicated that approximately 25% of students registered for summer school did not actually attend. Of those who did attend, nearly 20% dropped out before the mid-point of the session. Approximately 60% of students who attended summer school attended at least 70% of the time. In order to minimize the experimental mortality threat to internal validity, only summer school students who attended a minimum of 70% of the program were included in the study. Further, only students who did not attend any EACS summer school sessions within the given year were selected as matched-pair non-summer school counterparts.

Description of the School District

The site of this quasi-experimental study was East Allen County Schools (EACS), a public school corporation located on the eastern side of the Fort Wayne, Indiana, metropolitan area. EACS ranked among the 25 largest school districts in the state of Indiana for each of the years under investigation. The district serves the entire eastern half of Allen County, an area of approximately 344 square miles, including the communities of Grabill, Harlan, Hoagland, Leo-Cedarville, Monroeville, New Haven, and Woodburn, as well as a portion of the city of Fort Wayne.

EACS is comprised of 11 elementary schools, two middle schools, three junior/senior high schools, two high schools, and two alternative school programs. Total enrollment for the district ranged from 9,731 in 2002-2003 to 10,344 students in 2005-2006. Enrollment declined in each of the two successive years to 10,193 in the 2007-2008 school year.

Over the period of the study, approximately 74% of EACS students in grades pre-K-12 were White, 17% Black, 4% Hispanic, 2% Asian, 3% multi-racial, and 0.2% American Native. Enrollment of Hispanic and multi-racial students increased over 60%, representing an increase of just over 1.4 percentage points of the total population for each ethnic group. The number of Asian students more than tripled, representing an increase from less than 1% of the student population to just over 2%. Relative proportions of male and female students in the district remained stable, with males accounting for just over 51% of the total student population and females comprising just over 48%. The number of students receiving free/reduced lunches increased by over 30%, representing an increase of nearly seven percentage points over the course of the study. Specific demographic information is presented in Tables 3 and 4.

Table 3

Total Number of EACS Students Enrolled in Grades Pre-K through 12

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Enrollment	9,731	9,936	10,119	10,344	10,228	10,193
Free/reduced lunch	2,812	3,198	3,591	3,620	3,434	3,657
Paid lunch	6,919	6,738	6,528	6,724	6,794	6,536
White	7,347	7,525	7,476	7,591	7,507	7,427
Black	1,688	1,762	1,852	1,842	1,782	1,690
Hispanic	268	280	346	412	416	441
Asian	66	78	97	111	117	219
Multi-racial	247	270	329	366	387	397
Native American	25	21	19	22	19	19
Male	5,032	5,140	5,180	5,325	5,254	5,272
Female	4,699	4,796	4,939	5,019	4,974	4,921

Note. Indiana Department of Education (2008).

Table 4

Percentage of Total Number of EACS Students Enrolled in Grades Pre-K through 12

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	28.9	32.2	35.5	35.0	33.6	35.8
Paid lunch	71.1	67.8	64.5	65.0	66.4	64.1
White	76.4	75.7	73.8	73.4	73.4	72.9
Black	17.3	17.7	18.3	17.8	17.4	16.6
Hispanic	2.8	2.8	3.4	4.0	4.1	4.3
Asian	0.7	0.8	1.0	1.1	1.1	2.1
Multi-racial	2.5	2.7	3.3	3.5	3.8	3.9
Native American	0.3	0.2	0.2	0.2	0.2	0.2
Male	51.7	51.7	51.2	51.5	51.4	51.7
Female	48.3	48.3	48.8	48.5	48.6	48.3

Note. Indiana Department of Education (2008).

The demographics of EACS parallel those of students enrolled in public schools throughout the state of Indiana. Over the period of the study, approximately 79% of Indiana public school students in grades K-12 were White, 12% Black, 6% Hispanic, 1% Asian, 3% Multi-racial, and 0.2% American Native. Relative proportions of male and female students across the state remained stable, with males accounting for just over 51% of the total student population and females comprising just over 48%. Statewide, there was an increase of nearly six

percentage points of students receiving free/reduced lunches over the course of the study.

Specific demographic information for the state of Indiana is reflected in Tables 5 and 6.

Table 5

Total Number of Students Enrolled in Indiana Public Schools in Grades K through 12

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Enrollment	1,001,937	1,010,659	1,021,197	1,034,727	1,045,700	1,046,609
Free/reduced lunch	327,304	349,111	369,453	373,032	392,344	410,100
Paid lunch	674,633	658,548	651,744	661,695	653,356	636,509
White	807,466	805,205	802,370	803,349	801,240	793,730
Black	118,591	120,976	123,244	125,651	127,228	127,709
Hispanic	42,087	47,173	52,665	58,714	64,120	68,206
Asian	10,407	10,865	11,839	12,314	13,289	14,149
Multi-racial	20,692	23,972	28,539	32,054	37,049	40,026
Native American	2,694	2,468	2,540	2,645	2,774	2,789
Male	515,182	519,444	524,900	531,704	537,023	537,074
Female	486,755	491,215	496,297	503,023	508,677	509,535

Note: Indiana Department of Education (2008)

Table 6

Percentage of Total Number of Students Enrolled in Indiana Public Schools Grades K through 12

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	33.0	35.0	36.0	36.0	38.0	39.0
Paid lunch	67.0	65.0	64.0	64.0	62.0	61.0
White	81.0	80.0	79.0	78.0	77.0	76.0
Black	12.0	12.0	12.0	12.0	12.0	12.0
Hispanic	4.0	5.0	5.0	6.0	6.0	7.0
Asian	1.0	1.0	1.0	1.0	1.0	1.0
Multi-racial	2.0	2.0	3.0	3.0	4.0	4.0
Native American	0.0	0.0	0.0	0.0	0.0	0.0
Male	51.0	51.0	51.0	51.0	51.0	51.0
Female	49.0	49.0	49.0	49.0	49.0	49.0

Note: Indiana Department of Education (2008)

Tables 7, 8, 9, and 10 lend perspective to the demographics of EACS grades 2–5, the grade levels that were under consideration within this study. Grade 6 demographics, shown in Table 11, are included as fifth grade summer school students and their non-summer school counterparts participated in fall NWEA testing as sixth graders. Free/reduced lunch status and paid lunch data was not available by grade level prior to the 2004-2005 school year.

Table 7

Percentage of EACS Grade 2 Students

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	N/A	N/A	42.0	42.7	43.8	44.3
Paid lunch	N/A	N/A	58.0	57.3	56.2	55.7
White	73.7	76.2	76.1	70.7	67.1	67.8
Black	16.0	15.0	16.0	18.8	21.2	17.8
Hispanic	4.3	4.6	3.1	4.8	4.4	6.5
Asian	1.4	0.3	1.6	1.3	1.3	2.5
Multi-racial	4.5	3.8	3.2	3.8	5.8	5.3
Native American	0.0	0.1	0.0	0.5	0.1	0.0
Male	54.3	48.2	47.4	49.3	49.2	50.1
Female	45.7	51.8	52.6	50.7	50.8	49.9

Note: Indiana Department of Education (2008)

Table 8

Percentage of EACS Grade 3 Students

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	N/A	N/A	38.9	42.0	40.4	45.4
Paid lunch	N/A	N/A	61.1	58.0	59.6	54.6
White	74.0	72.8	76.5	74.3	71.9	67.7
Black	17.7	17.6	14.9	16.0	16.7	19.0
Hispanic	4.5	4.0	4.7	3.3	4.9	4.6
Asian	0.9	1.4	0.3	1.7	1.5	3.1
Multi-racial	2.9	4.0	3.5	4.6	4.5	5.6
Native American	0.1	0.1	0.1	0.0	0.5	0.0
Male	50.9	54.2	47.8	48.9	48.7	49.6
Female	49.1	45.8	52.2	51.1	51.3	50.4

Note: Indiana Department of Education (2008)

Table 9

Percentage of EACS Grade 4 Students

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	N/A	N/A	36.7	38.8	38.6	41.7
Paid lunch	N/A	N/A	63.3	61.2	61.4	58.3
White	74.0	73.6	71.8	74.5	73.2	72.5
Black	17.4	17.6	18.1	15.3	16.8	16.2
Hispanic	3.2	4.8	4.5	4.6	3.1	4.9
Asian	1.2	0.8	1.7	0.7	2.2	1.8
Multi-racial	4.0	3.1	3.8	4.4	4.8	4.1
Native American	0.3	0.1	0.1	0.1	0.0	0.4
Male	53.7	53.0	54.8	49.5	49.7	49.9
Female	46.3	46.9	45.2	50.5	50.3	50.1

Note: Indiana Department of Education (2008)

Table 10

Percentage of EACS Grade 5 Students

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	N/A	N/A	42.8	36.6	37.1	41.3
Paid lunch	N/A	N/A	57.2	63.4	62.9	58.7
White	72.9	73.5	72.1	71.0	74.3	72.5
Black	19.1	17.8	18.5	17.8	16.3	15.7
Hispanic	3.1	3.0	4.7	4.9	4.6	3.8
Asian	0.8	1.1	1.1	1.8	0.7	3.4
Multi-racial	3.7	4.4	3.5	4.4	4.1	4.4
Native American	0.4	0.1	0.1	0.1	0.1	0.1
Male	54.3	53.0	53.2	54.8	50.1	48.9
Female	45.7	47.0	46.8	45.2	49.9	51.1

Note: Indiana Department of Education (2008)

Table 11

Percentage of EACS Grade 6 Students

Descriptor	School Year					
	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Free/reduced lunch	N/A	N/A	37.6	40.3	35.8	36.6
Paid lunch	N/A	N/A	62.4	59.7	64.2	63.4
White	73.1	71.3	72.4	71.4	71.3	74.6
Black	19.7	20.9	18.5	19.1	17.3	15.2
Hispanic	3.0	2.9	3.1	4.6	5.1	5.1
Asian	0.3	0.8	1.0	0.9	1.6	1.1
Multi-racial	3.6	3.8	4.7	3.7	4.6	3.9
Native American	0.3	0.4	0.2	0.4	0.1	0.1
Male	50.9	51.7	53.1	52.0	55.3	50.4
Female	49.1	48.3	46.9	48.0	44.7	49.6

Note: Indiana Department of Education (2008)

Description of the Summer School Program

Although non-scripted summer school remediation instruction was delivered at multiple sites in each year of the study, overall summer school programming was coordinated through the district's central office according to the following guidelines:

1. Students received a maximum of 60 hours of remediation instruction over the summer timeframe.
2. Student participation was voluntary.

3. Parental permission was required for participation in summer school.
4. All students who worked on a standards-based curriculum and who participated in ISTEP+ in the year prior to the summer session were eligible to attend; however, students who did not pass ISTEP+ and/or those whose spring NWEA scores fell at or below mean anticipated scores were strongly encouraged to attend.
5. The district provided round-trip bus transportation for all students.
6. The district provided breakfast for all summer school participants.
7. Students attended summer school at the home school and grade level from which they were leaving.
8. Teachers were selected from the current building staff of certified personnel at the time of the summer session. If a building did not have enough of its own certified personnel to accommodate all positions, those positions that were unfilled were posted through Human Resources, as required by contract.
9. Staffing was allocated to achieve a student/teacher ratio of 15:1. Multi-grade-level classes were utilized where necessary to obtain an appropriate student/teacher ratio.
10. Principals were advised to be proactive and consistent in making home contacts for those students who were absent.
11. Each teacher was responsible for maintaining accurate daily attendance information and sending it electronically to the appropriate personnel on the last day of student attendance.
12. Each teacher was required to prepare a daily schedule and lesson plans, and acquire his/her own teaching resources that best addressed his/her students' academic needs. Schedules included the number of minutes teachers spent in areas including, but not

- limited to reading skills (comprehension, word building, decoding, fluency, phonics, and vocabulary), grammar, process writing, math computation, and math problem solving.
13. Each teacher was provided spring NWEA performance information for each summer school participant.
 14. Student progress during each summer session was monitored according to each teacher's discretion. That is, the district's central office did not establish a formal grading structure or define minimum performance standards for successful completion of the summer school program.
 15. Formal assessment of student progress for both summer school participants and their counterparts was monitored through NWEA MAP testing in the spring and fall of each school year.
 16. Each administration of NWEA MAP testing occurred within a defined testing window at all sites.

Instrumentation

For each year of this study, student achievement levels were operationally defined as the differences in student RIT scores between respective spring and fall NWEA MAP administrations in reading, language usage, and math for second through fifth grade summer school participants and their matched-pair counterparts. NWEA's computer-adaptive MAP testing was utilized as the instrument of choice for program evaluation based, in part, on the organization's completion of norming studies involving over 1.05 million students from 323 school districts in 24 states in 2002, to describe student achievement status along the RIT scale. These studies allow educators to compare performance of students within a class or grade level

to that of other schools across the nation (Northwest Evaluation Association, 2002). NWEA underwent a second norming process in 2005, the results of which were from more than 2.3 million students in 794 school districts, representing 32 states (Northwest Evaluation Association, 2005).

Within East Allen County Schools, NWEA MAP tests were administered under conditions prescribed by the Northwest Evaluation Association to ensure confidence in resulting test scores. These conditions address hardware issues, testing environment, proctoring and scheduling requirements, preparing students for testing, and report interpretation (Northwest Evaluation Association, 2001a). All schools within the district administered both spring and fall testing within defined testing windows that remained consistent throughout each year of the current study.

Permission to utilize NWEA testing data for monitoring student performance and growth at individual, class, grade level, school, and district levels, as well as for program progress and evaluation, was granted through the licensing agreement between the Northwest Evaluation Association and East Allen County Schools. The licensing agreement was initiated during the 2001-2002 school year, and was renewed or maintained throughout each subsequent school year to the present.

Variables in the Study

The independent variables included summer school participation, gender, SES, and ethnicity. The dependent variables included the student RIT scores on the fall administration of the NWEA MAP test (post-test) in each of three subject areas (language usage, reading, and math) for each grade level (2–5), in each year of the study under investigation. The covariates included the student RIT scores on the spring administration of the NWEA MAP test (pre-test) in

each of the same subject areas and grade levels in each year of the study under investigation. Matched pairs were based upon spring RIT scores in each subject area for each grade level.

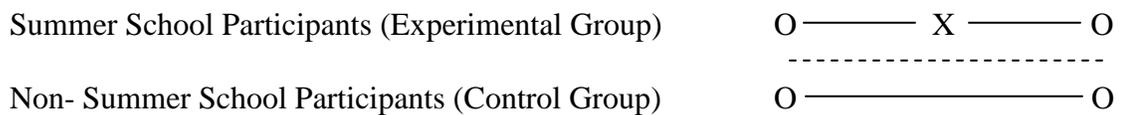
Experimental Design

For each year of this quasi-experimental study:

1. All students in grades 2 through 5 participated in NWEA MAP testing during the spring of each given year, yielding pre-test RIT scores.
2. Summer school was conducted according to established district guidelines, which served as the treatment condition within the experimental design.
3. At the conclusion of each year's summer school program, attendance records were examined to identify as participants in the experimental group only those students who attended a minimum of 70% of the summer school program.
4. Once identified, archival data was collected for each participant in the experimental group, including spring RIT scores (for reading, language usage, and math), gender, SES, and ethnicity.
5. Each experimental group student's RIT score (in a given subject) was matched with the same subject RIT score of a student in the same grade level who was not listed in the attendance records for the summer school program for the given year. Those matched-pair, non-summer school participants comprised the control group.
6. Archival data was collected for each member of the control group, including gender, SES, and ethnicity.
7. All students in grades 3 through 6 participated in NWEA MAP testing during the fall of the school year following each summer session, yielding post-test RIT scores in each subject area for study participants.

8. The differences between spring and fall scores for experimental and control groups of students were compared in each subject area at each grade level using tests of statistical significance to determine the effect of the treatment condition, while controlling for the effects of gender, SES, and ethnicity on those student achievement levels.

Given that “O” represents a measurement recorded through the use of an instrument (in this case, NWEA MAP tests in reading, language usage, and math), and that “X” represents the exposure of a group to an experimental variable, each year’s experimental design was represented as follows:



Threats to Validity

Several factors were recognized and addressed to increase the internal validity of this study. If not appropriately addressed, these factors would have limited the extent to which one could determine the causal relationship between summer school program participation and an improvement in student performance:

1. Students were not randomly assigned to either the summer school group or the non-summer school group. While random assignment to either group would have served the purpose of enhancing the experimental design, it would have done little to serve the overarching goal of improving student achievement. In order to compensate for the lack of randomness, students in the experimental (summer school participants) and control (non-summer school participants) groups were as equal as possible at the beginning point of the study. That is, data for each summer school student in the

- study was matched with a corresponding non-summer school student in the same grade (2, 3, 4, or 5) at the same school who had the same spring NWEA RIT score in a particular subject area (reading, language usage, or math).
2. Each subject area was considered separately, recognizing that students who improved in language usage, math, or reading may or may not have shown improvement in one or both of the other subject areas.
 3. One of the greatest concerns within this study was the length of time between the spring and fall administrations of the NWEA MAP test. This gap of time introduced the possibility that factors other than summer school may also have influenced student achievement. For example, some students may have participated in enrichment or remediation activities not sponsored by the school (e.g., private tutoring or the Summer Reading Program at the local public libraries). While pre- and post-testing during the summer program minimized the impact of these factors, both the experimental and control groups of students would have had to participate in such testing. The logistics of providing for non-summer school students to go to school to engage in pre- and post-testing during the summer session were prohibitive. The most practical approach was to maintain an awareness of this threat to internal validity, and look to future studies to examine this aspect more completely.
 4. Although maturation should be considered when looking at internal validity, the effects were minimized in this study by comparing experimental students to control students at the same grade level. The timeframe (approximately four months) between spring and fall testing was the same for both groups of students during each year of the study.

5. Two administrations of NWEA MAP tests resulted in scores that are subject to the same statistical regression to the mean as any other scores on a same or similar test administered a second time.
6. Consideration was given to students' experience with computer-adaptive testing methods and strategies. It should be noted that all EACS students in grades 2-10 have participated in both fall and spring NWEA MAP testing since the fall of 2002.
7. One could attempt to argue that students who attend summer school are *more motivated learners* than those who do not; therefore, they would tend to do better on the fall administration of the NWEA MAP test than their *less motivated* non-summer school counterparts. However, the impact of this selection concern was decreased by comparing groups of students with matched spring test scores.
8. Since participation in summer school has not been mandatory in East Allen County Schools, attendance and dropout rates have been longstanding problems reported by teachers during summer remediation sessions. In order to minimize the experimental mortality threat to internal validity, only summer school students who attended a minimum of 70% of the program were included in the study. Further, only students who did not attend any EACS summer school sessions within the given year were selected as matched-pair non-summer school counterparts.

Statistical Analysis

For each year of the study, the researcher collected pre- and post-test data for summer school participants and their non-summer school matched-pair counterparts according to grade level (2–5) for each subject area (reading, language usage, and math). Through descriptive statistical analysis, the means and standard deviations were determined for post-test RIT scores

for each of the aforementioned groups by grade level and subject area. The means were also determined for pre-test RIT scores for each of the aforementioned groups by grade level and subject area.

Analysis of covariance (ANCOVA) at the .05 probability level ($p=.05$) was used to determine if there was a statistically significant difference between student post-test RIT scores for summer school participants and their non-summer school counterparts, while controlling for gender, SES, and ethnicity. In order to isolate the effects of summer school for each grade level (2–5), there were 4 separate analyses, one for each elementary grade level, and 3 sub-analyses within each grade level – reading, language usage and math – leading to a total of 12 sets of ANCOVA analyses. Data was analyzed using SPSS 12.0.1 statistical software.

Summary

This chapter presented an overview of the purpose of this quasi-experimental study, research questions, null hypotheses, participants, descriptions of the school district and the summer school program, instrumentation, variables, experimental design, threats to validity, and data analysis. Chapter 4 reflects the findings of data analysis.

CHAPTER 4

Presentation and Analysis of Data

The purpose of this quantitative study was to better understand the effects of summer school remediation on elementary student achievement. The study compared the differences between student performance data on spring and fall administrations of Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) for matched pairs (based on student performance on spring NWEA MAP) of second through fifth grade summer school participants and non-summer school participants for each of five years, beginning in the summer of 2003. The independent variables included summer school participation, gender, SES, and ethnicity. The dependent variables included the student RIT scores on the fall administration of the NWEA MAP test (post-test) in each of three subject areas (language usage, reading, and math) for each grade level (2–5), in each year of the study under investigation. The covariates included the student RIT scores on the spring administration of the NWEA MAP test (pre-test) in each of the same subject areas and grade levels in each year of the study under investigation.

Research Question

After controlling for gender, SES, and ethnicity, was there a significant difference in student achievement in reading, language usage, and math for second through fifth graders based upon participation in a summer remediation program?

Null Hypotheses

H₀1: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for second graders based upon participation in a summer remediation program.

H₀2: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for second graders based upon participation in a summer remediation program.

H₀3: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for second graders based upon participation in a summer remediation program.

H₀4: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for third graders based upon participation in a summer remediation program.

H₀5: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for third graders based upon participation in a summer remediation program.

H₀6: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for third graders based upon participation in a summer remediation program.

H₀7: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fourth graders based upon participation in a summer remediation program.

H₀8: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fourth graders based upon participation in a summer remediation program.

H₀9: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fourth graders based upon participation in a summer remediation program.

H₀10: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fifth graders based upon participation in a summer remediation program.

H₀11: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fifth graders based upon participation in a summer remediation program.

H₀12: After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fifth graders based upon participation in a summer remediation program.

Study Participants

Study participants were convenience samples of summer school students and their non-summer school counterparts in grades 2–5 from multiple elementary school sites within a single school district, East Allen County Schools (EACS), in northeast Indiana. To compensate for the lack of randomness, students in the experimental groups (summer school participants) were matched with their control group counterparts (non-summer school participants) who performed at the same RIT score level in each particular subject area (reading, language usage, or math) on the spring administration of the NWEA MAP for each year under investigation.

Only summer school participants with both spring and fall NWEA MAP test scores for a given year were included in the study, and those students were matched only to students who will also had taken both spring and fall NWEA MAP subject tests for the given year. That is, any summer school student with spring NWEA MAP scores who completed the entire summer school session, but moved away from the district prior to the fall NWEA MAP administration, was not included in the study. Similarly, any control-group student with spring NWEA MAP scores who moved away from the district prior to the fall NWEA MAP administration was not included in the study. No student without valid spring NWEA test scores for the given year was included in the study. Only summer school students who attended a minimum of 70% of the program were included in the study. Further, only students who did not attend any EACS summer school sessions within the given year were selected as matched-pair non-summer school counterparts.

As summer school programming remained the same for each year of the study, scores from each of the five years were combined for analysis according to subject and grade level to lend an overall perspective. For language usage, there were 850 matched pairs of summer school students and their non-summer school counterparts. These included 219 matched pairs from second grade, 242 from third grade, 192 from fourth grade, and 197 from fifth grade, totaling 1,700 students. For math, there were 828 matched pairs, including 188 matched pairs from second grade, 249 from third grade, 201 from fourth grade, and 190 from fifth grade, totaling 1,656 students. The study also included 853 matched pairs of summer school students and their non-summer school counterparts for reading, including 212 matched pairs from second grade, 242 from third grade, 197 from fourth grade, and 202 from fifth grade, totaling 1,706 students.

Analysis of covariance (ANCOVA) at the .05 probability level ($p = .05$) was used to determine if there was a statistically significant difference between student post-test RIT scores for summer school participants and their non-summer school counterparts, while controlling for gender, SES, and ethnicity. In order to isolate the effects of summer school for each grade level (2–5), there were 4 separate analyses, one for each elementary grade level, and 3 sub-analyses within each grade level—reading, language usage and math—leading to a total of 12 sets of ANCOVA analyses. Preliminary checks were conducted prior to each analysis to ensure that there were no violations of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate.

Grade 2.

H₀₁. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for second graders based upon participation in a summer remediation program. Table 12 presents descriptive information for language usage for students in grade 2.

ANCOVA results indicated a significant interaction effect between summer school participation and SES for grade 2 language usage students $F(1,421) = 4.580, p = .033$, with a small effect size (partial eta squared = .011); therefore, the null hypothesis was rejected. None of the main effects were statistically significant, summer school participation: $F(1,421) = 1.296, p = .256$; gender: $F(1,421) = 2.863, p = .091$; ethnicity: $F(1,421) = .083, p = .773$. There was no significant interaction effect between summer school participation and gender $F(1,421) = .095, p = .759$, or between summer school participation and ethnicity $F(1,421) = .851, p = .357$. These results suggest that second grade free/reduced lunch students responded to summer school programming for language usage differently than paid lunch students. While free/reduced lunch

summer school students scored higher than their non-summer school counterparts on the post-test, paid lunch non-summer school students performed significantly better than their summer school counterparts on the post-test. Clearly, summer school program design and interventions for second graders in language usage should take into consideration the SES of program participants.

Table 12

Mean Language Usage Post-test RIT Scores for Grade 2

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	183.52	12.61	109	183.83	10.66	118
Paid lunch	188.53	13.34	110	185.22	11.97	101
White	186.15	13.48	125	184.59	12.07	125
All other ethnicities	185.88	12.88	94	184.31	10.19	94
Male	184.81	13.36	132	183.15	11.61	132
Female	187.90	12.79	87	186.47	10.51	87
Total	186.04	13.20	219	184.47	11.28	219

Note. Pre-test RIT Language Usage RIT Score = 182.33

H₀2. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for second graders based upon participation in a summer remediation program. Table 13 includes descriptive information for math for students in grade 2.

Table 13

Mean Math Post-test RIT Scores for Grade 2

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	187.29	9.61	107	187.56	8.26	107
Paid lunch	190.58	9.41	81	185.52	9.91	81
White	189.48	9.71	110	186.71	9.63	110
All other ethnicities	187.62	9.50	78	186.64	8.21	78
Male	189.31	10.21	117	186.21	10.00	117
Female	187.72	8.59	71	187.46	7.19	71
Total	188.71	9.64	188	186.68	9.04	188

Note. Pre-test RIT Math RIT Score = 184.36

ANCOVA results for second grade math students also indicated a significant interaction effect between summer school participation and SES $F(1,359) = 6.400, p = .012$, with a small effect size (partial eta squared = .018); therefore, the null hypothesis was rejected. Neither of the main effects of gender or ethnicity were statistically significant, gender: $F(1,359) = .313, p = .576$; ethnicity: $F(1,359) = .632, p = .427$. There was no significant interaction effect between summer school participation and gender $F(1,359) = 2.499, p = .115$, or between summer school participation and ethnicity $F(1,359) = .076, p = .782$. These results suggest that second grade free/reduced lunch students responded to summer school programming for math differently than paid lunch students. While free/reduced lunch summer school students scored nearly the same as their non-summer school counterparts on the post-test, paid lunch non-summer school students

performed significantly better than their summer school counterparts on the post-test. These results underscore the need to consider the SES of program participants when designing a summer school program and interventions for second graders in math.

H₀₃. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for second graders based upon participation in a summer remediation program. Table 14 presents descriptive information for reading for students in grade 2.

Table 14

Mean Reading Post-test RIT Scores for Grade 2

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	179.46	12.45	103	179.46	11.75	110
Paid lunch	184.28	14.88	109	183.09	12.54	102
White	182.25	14.32	125	181.82	13.14	125
All other ethnicities	181.48	13.43	87	180.33	10.84	87
Male	182.10	14.36	127	180.21	13.03	127
Female	181.68	13.35	85	182.69	10.87	85
Total	181.93	13.93	212	181.21	12.24	212

Note. Pre-test RIT Reading RIT Score = 178.22

ANCOVA results for second grade reading students showed no significant difference in post-test performance for summer school and non-summer school students for any of the interactions or main effects; therefore, the researcher failed to reject the null hypothesis. There

was, however, a significant relationship between the covariate (pre-test scores) and the dependent variable (post-test scores), while controlling for the independent variables $F(1,407) = 424.545, p < .0005$, thus accounting for 51% of the variance in the dependent variable (partial eta squared = .511). The ANCOVA results are summarized in Table 15.

Table 15

Analysis of Covariance Summary for Grade 2 Reading

Source	Sum of Squares	df	Mean Square	F	p	Partial Eta Squared
Pre-test	35504.993	1	35504.993	424.545**	.000	.511
Student ^a	148.890	1	148.890	1.780	.083	.004
Gender	20.533	1	20.533	.246	.621	.001
Ethnicity	37.530	1	37.530	.449	.503	.001
SES	261.632	1	261.632	3.128	.078	.008
Student ^a X Gender	128.126	1	128.126	1.532	.217	.004
Student ^a X Ethnicity	180.064	1	180.064	2.153	.143	.005
Student ^a X SES	252.193	1	252.193	3.016	.083	.007
Error	34037.685	407	83.631			

Note. ^a student=summer school and non-summer school student groups; ** $p < .05$

Grade 3.

H₀₄. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for third graders based upon participation in a summer remediation program. Table 16 contains descriptive information for grade 3 language usage students.

Table 16

Mean Language Usage Post-test RIT Scores for Grade 3

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	192.58	11.85	106	196.14	10.42	106
Paid lunch	198.35	12.61	136	196.09	11.46	136
White	195.56	13.06	156	195.55	11.63	156
All other ethnicities	196.31	11.74	86	195.90	9.83	86
Male	193.93	13.07	138	193.82	11.62	138
Female	198.35	11.50	104	198.13	9.65	104
Total	195.83	12.59	242	195.67	11.01	242

Note. Pre-test RIT Language Usage RIT Score = 195.93

Just as for second grade language usage students, ANCOVA results for third grade language usage students indicated a significant interaction effect between summer school participation and SES $F(1,467) = 7.675, p = .006$, with a small effect size (partial eta squared = .016); therefore, the null hypothesis was rejected. None of the main effects were statistically significant, summer school participation: $F(1,467) = 1.074, p = .301$; gender: $F(1,467) = 1.299, p = .255$; ethnicity: $F(1,467) = 2.964, p = .086$. There was no significant interaction effect between summer school participation and gender $F(1,467) = .232, p = .630$, or between summer school participation and ethnicity $F(1,467) = 2.379, p = .124$. These results suggest that third grade free/reduced lunch students responded to summer school programming for language usage differently than paid lunch students. Free/reduced lunch summer school students scored

significantly higher than their non-summer school counterparts on the post-test, while paid lunch non-summer school students performed significantly better than their summer school counterparts on the post-test. Summer school program design and interventions for third graders in language usage should take into consideration the SES of program participants, just as for second grade language usage students.

H₀₅. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for third graders based upon participation in a summer remediation program. Table 17 includes descriptive information for grade 3 language usage students.

Table 17

Mean Math Post-test RIT Scores for Grade 3

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	196.62	9.59	113	197.74	9.83	114
Paid lunch	201.15	11.26	136	199.07	9.12	135
White	200.45	11.17	154	199.51	9.30	154
All other ethnicities	198.08	9.66	95	196.76	9.50	95
Male	200.21	11.56	144	198.51	9.95	144
Female	198.65	9.27	105	198.39	8.78	105
Total	199.55	10.66	249	198.46	9.46	249

Note. Pre-test RIT Math RIT Score = 197.21

ANCOVA results for third grade math students showed no significant difference in post-test performance for summer school and non-summer school students for any of the interactions

or main effects; therefore, the researcher failed to reject the null hypothesis. There was, however, a significant relationship between the covariate (pre-test scores) and the dependent variable (post-test scores), while controlling for the independent variables $F(1,481) = 468.973$, $p < .0005$, thus accounting for 49% of the variance in the dependent variable (partial eta squared = .494). Results of the ANCOVA analysis are summarized in Table 18.

Table 18

Analysis of Covariance Summary for Grade 3 Math

Source	Sum of Squares	df	Mean Square	F	p	Partial Eta Squared
Pre-test	23923.010	1	23923.010	468.973**	.000	.494
Student ^a	92.789	1	92.789	1.819	.178	.004
Gender	24.954	1	24.954	.489	.485	.001
Ethnicity	62.242	1	62.242	1.220	.270	.003
SES	43.847	1	43.847	.860	.354	.002
Student ^a X Gender	5.149	1	5.149	.101	.751	.000
Student ^a X Ethnicity	19.362	1	19.362	.380	.538	.001
Student ^a X SES	27.219	1	27.219	.534	.465	.001
Error	24536.525	481	51.011			

Note. ^aStudent = summer school and non-summer school student groups; ** $p < .05$

H₀₆. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for third graders based upon participation in a summer remediation program. Descriptive information for grade 3 reading students appears in Table 19.

Table 19

Mean Reading Post-test RIT Scores for Grade 3

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	191.95	12.53	119	190.68	13.29	107
Paid lunch	195.47	14.56	123	192.45	12.72	135
White	195.20	14.07	153	192.65	13.27	153
All other ethnicities	191.24	12.70	89	189.99	12.36	89
Male	191.65	14.90	136	189.42	14.79	136
Female	196.42	11.48	106	194.56	9.51	106
Total	193.74	13.69	242	191.67	12.98	242

Note. Pre-test RIT Reading RIT Score = 191.32

Results of ANCOVA analysis for third grade reading students showed no significant interaction effect between summer school participation and gender $F(1,467) = .063, p = .801$; between summer school participation and ethnicity $F(1,467) = .003, p = .958$; or between summer school participation and SES $F(1,467) = 3.235, p = .073$. None of the main effects of gender, ethnicity, or SES were statistically significant, gender: $F(1,467) = 3.058, p = .081$; ethnicity: $F(1,467) = .487, p = .485$; SES: $F(1,467) = .075, p = .785$. Participation in summer school was shown to have a significant main effect on post-test reading scores with summer school students scoring significantly lower than their non-summer school counterparts, $F(1,467) = 6.671, p = .010$, with a small effect size (partial eta squared = .014); therefore, the null hypothesis was

rejected. These results suggest the need to carefully scrutinize and revise summer school programming for reading, especially for third graders.

Grade 4.

H₀₇. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fourth graders based upon participation in a summer remediation program. Table 20 presents descriptive information for language usage students in grade 4.

Table 20

Mean Language Usage Post-test RIT Scores for Grade 4

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	202.43	11.24	77	201.84	11.70	90
Paid lunch	203.75	10.70	115	202.63	11.25	102
White	203.71	10.73	148	201.96	11.67	148
All other ethnicities	201.57	11.47	44	203.27	10.66	44
Male	201.20	11.53	108	199.10	11.10	108
Female	205.81	9.50	84	206.32	10.61	84
Total	203.22	10.91	192	202.26	11.44	192

Note. Pre-test RIT Language Usage RIT Score = 201.10

ANCOVA results indicated a significant interaction effect between summer school participation and gender for grade 4 language usage students $F(1,367) = 6.801, p = .009$, with a small effect size (partial eta squared = .018). None of the main effects were statistically

significant, summer school participation: $F(1,367) = .083, p = .774$; ethnicity: $F(1,367) = .051, p = .822$; SES: $F(1,421) = .887, p = .347$. There was no significant interaction effect between summer school participation and ethnicity $F(1,367) = 1.625, p = .203$, or between summer school participation and SES $F(1,367) = 1.019, p = .313$. These results suggest that fourth grade males responded to summer school programming for language usage differently than females. While female non-summer school students scored higher on the post-test than male non-summer school students, female summer school students performed significantly better on the post-test than male summer school students. This suggests that summer school program design and interventions for fourth graders in language usage should take into consideration the gender of program participants.

Table 21

Mean Math Post-test RIT Scores for Grade 4

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	202.93	10.85	76	203.83	9.65	95
Paid lunch	208.51	10.66	125	207.53	8.53	106
White	207.94	10.57	159	206.20	9.32	159
All other ethnicities	200.60	10.98	42	204.19	8.84	42
Male	205.64	11.45	112	205.43	9.38	112
Female	207.36	10.49	89	206.22	9.09	89
Total	206.40	11.04	201	205.78	9.24	201

Note. Pre-test RIT Math RIT Score = 204.33

H₀₈. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fourth graders based upon participation in a summer remediation program. Table 21 includes descriptive information for math students in grade 4.

Results of ANCOVA analysis for fourth grade math students showed no significant interaction effect between summer school participation and gender $F(1,385) = .007, p = .934$; between summer school participation and ethnicity $F(1,385) = 3.332, p = .069$; or between summer school participation and SES $F(1,385) = .248, p = .618$. None of the main effects of summer school participation, gender, or ethnicity were statistically significant, summer school participation: $F(1,385) = .566, p = .452$; gender: $F(1,385) = .012, p = .914$; ethnicity: $F(1,385) = 1.115, p = .292$. SES was shown to have a significant main effect on post-test math scores with paid lunch students scoring significantly higher than their free/reduced lunch counterparts,

Table 22

Mean Reading Post-test RIT Scores for Grade 4

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	199.57	12.89	79	197.39	13.92	96
Paid lunch	202.86	12.38	118	200.99	11.14	101
White	202.42	12.50	151	200.15	12.89	151
All other ethnicities	198.65	12.88	46	196.22	11.51	46
Male	200.09	13.13	114	197.18	13.29	114
Female	203.53	11.77	83	202.06	11.22	83
Total	201.54	12.66	197	199.23	12.66	197

Note. Pre-test RIT Reading RIT Score = 198.95

$F(1,385) = 3.997, p = .046$, with a small effect size (partial eta squared = .010); therefore the null hypothesis was rejected. These results underscore the significant effect of SES on student performance for fourth grade math students.

H₀9. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fourth graders based upon participation in a summer remediation program. Table 22 reflects descriptive information for reading students in grade 4.

Results of ANCOVA analysis for fourth grade reading students were similar to those for third grade reading students, showing no significant interaction effect between summer school participation and gender $F(1,377) = .624, p = .430$; between summer school participation and ethnicity $F(1,377) < .0005, p = .989$; or between summer school participation and SES $F(1,377) = .356, p = .551$. None of the main effects of gender, ethnicity, or SES were statistically significant, gender: $F(1,377) = .682, p = .410$; ethnicity: $F(1,377) = .020, p = .889$; SES: $F(1,377) = .386, p = .535$. Participation in summer school was shown to have a significant main effect on post-test reading scores with summer school students scoring significantly lower than their non-summer school counterparts, $F(1,377) = 5.226, p = .023$, with a small effect size (partial eta squared = .014); therefore, the null hypothesis was rejected. These results suggest the need to carefully scrutinize and revise summer school programming for reading at the fourth grade level, as well as for third grade reading students.

Grade 5.

H₀10. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in language usage for fifth graders based upon participation in a summer remediation program. Table 23 includes descriptive information for language usage for grade 5 students.

Table 23

Mean Language Usage Post-test RIT Scores for Grade 5

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	203.44	13.24	73	205.00	12.05	93
Paid lunch	210.21	10.58	124	208.34	10.43	105
White	210.19	10.86	147	208.39	10.51	147
All other ethnicities	200.38	12.50	50	201.96	12.31	50
Male	206.42	12.73	188	205.95	12.13	118
Female	209.61	10.76	79	207.97	9.91	79
Total	207.70	12.05	197	206.76	11.31	197

Note. Pre-test RIT Language Usage RIT Score = 208.38

Results of ANCOVA analysis for fifth grade language usage students showed no significant interaction effect between summer school participation and gender $F(1,377) = .118, p = .732$; between summer school participation and ethnicity $F(1,377) = 2.715, p = .100$; or between summer school participation and SES $F(1,377) = .065, p = .799$. Participation in summer school was not shown to have a significant main effect on post-test language usage scores $F(1,377) = .022, p = .883$. Each of the main effects of gender, ethnicity, and SES were statistically significant, gender: $F(1,377) = 5.256, p = .022$, with a small effect size (partial eta squared = .014); ethnicity: $F(1,377) = 5.107, p = .024$, with a small effect size (partial eta squared = .013); and SES: $F(1,377) = 5.226, p = .023$, with a small effect size (partial eta squared = .014). The null hypothesis was therefore rejected. These results emphasize the significant effects of gender,

ethnicity, and SES on student performance for fifth grade language usage students. Females significantly outperformed males on the language usage post-test without regard to summer school participation. White students significantly outperformed students of all other ethnicities on the language usage post-test. Paid lunch students also scored significantly higher on the language usage post-test than their free/reduced lunch peers. It is important to consider each of these factors when designing summer school language usage programs and interventions for fifth grade students.

H₀₁₁. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in math for fifth graders based upon participation in a summer remediation program. Table 24 presents descriptive information for math for grade 5 students.

Table 24

Mean Math Post-test RIT Scores for Grade 5

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	208.96	16.45	71	211.56	14.03	93
Paid lunch	216.03	11.82	119	215.42	11.33	97
White	216.31	12.39	137	216.19	11.37	137
All other ethnicities	205.83	15.55	53	206.83	13.95	53
Male	213.88	15.48	118	214.19	14.66	118
Female	212.58	11.60	72	212.46	9.09	72
Total	213.39	14.12	190	213.53	12.84	190

Note. Pre= test RIT Math RIT Score = 213.25

Results of ANCOVA analysis for fifth grade math students also showed no significant interaction effect between summer school participation and gender $F(1,363) = .009, p = .923$; between summer school participation and ethnicity $F(1,363) = .173, p = .678$; or between summer school participation and SES $F(1,363) = .003, p = .953$. None of the main effects of summer school participation, gender, or SES were statistically significant, summer school participation: $F(1,363) = .229, p = .632$; gender: $F(1,363) = 3.824, p = .051$; SES: $F(1,363) = .133, p = .716$. Ethnicity was shown to have a significant main effect on post-test math scores with White students scoring significantly higher than students of all other ethnicities, regardless of participation in summer school, $F(1,363) = 5.265, p = .022$, with a small effect size (partial eta squared = .014); therefore, the null hypothesis was rejected. These results reinforce the need to consider the impact of ethnicity when designing summer school math programs and all other interventions for fifth grade math students.

H₀12. After controlling for gender, SES, and ethnicity, there is no significant difference in student achievement in reading for fifth graders based upon participation in a summer remediation program. Table 25 includes descriptive information for reading for grade 5 students.

Table 25

Mean Reading Post-test RIT Scores for Grade 5

Descriptor	Non-summer School Students			Summer School Students		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Free/reduced lunch	203.26	14.16	77	202.17	12.58	95
Paid lunch	209.28	13.80	125	206.32	11.59	107
White	209.90	12.78	147	207.04	10.21	147
All other ethnicities	199.18	17.98	55	197.22	14.20	55
Male	206.85	15.26	124	204.68	12.77	124
Female	207.21	12.45	78	203.87	11.34	78
Total	206.99	14.21	202	204.37	12.21	202

Note. Pre-test RIT Reading RIT Score = 206.44

ANCOVA results for fifth grade reading students were similar to those for second grade reading students. That is, they showed no significant difference in post-test performance for summer school and non-summer school students for any of the interactions or main effects; therefore, the researcher failed to reject the null hypothesis. There was, however, a significant relationship between the covariate (pre-test scores) and the dependent variable (post-test scores), while controlling for the independent variables $F(1,387) = 363.572, p < .0005$, thus accounting for 48% of the variance in the dependent variable (partial eta squared = .484). The ANCOVA results are summarized in Table 26.

Table 26

Analysis of Covariance Summary for Grade 5 Reading

Source	Sum of Squares	df	Mean Square	F	p	Partial Eta Squared
Pre-test	29367.350	1	29367.350	363.572**	.0000	.484
Student ^a	295.259	1	295.259	3.655	.0570	.009
Gender	232.056	1	232.056	2.873	.0910	.007
Ethnicity	220.700	1	220.700	2.732	.0990	.007
SES	132.261	1	132.261	1.637	.2010	.004
Student ^a X Gender	.806	1	.806	.010	.9200	.000
Student ^a X Ethnicity	41.330	1	41.330	.512	.4750	.001
Student ^a X SES	5.288	1	5.288	.065	.0798	.000
Error	31259.708	387	80.774			

Note. ^aStudent = summer school and non-summer school student groups; **p<.05

Summary

As summer school programming remained the same for each year of the study, scores from each of the five years were combined for analysis according to subject and grade level to lend an overall perspective. For language usage, data was collected for 850 matched pairs of summer school students and their non-summer school counterparts across grades 2–5, totaling 1,700 students. For math, there were 828 matched pairs, totaling 1,656 students. The study also included 853 matched pairs of summer school students and their non-summer school counterparts for reading, totaling 1,706 students.

Analysis of covariance (ANCOVA) at the .05 probability level ($p=.05$) was used to determine if there was a statistically significant difference between student post-test RIT scores for summer school participants and their non-summer school counterparts, while controlling for gender, SES, and ethnicity. In order to isolate the effects of summer school for each grade level (2–5), there were 4 separate analyses, one for each elementary grade level, and 3 sub-analyses within each grade level—reading, language usage and math—leading to a total of 12 sets of ANCOVA analyses.

The results of ANCOVA analysis showed a significant interaction effect between summer school participation and SES for both language usage and math in grade 2. These results suggest that second grade free/reduced lunch students responded differently than paid lunch students to summer school programming for language usage and math. The null hypothesis was rejected for each of these subjects. The researcher failed to reject the null hypothesis for second grade reading, as there were no significant interaction effects or main effects of the independent variables on post-test RIT scores.

For third grade, ANCOVA analysis also showed a significant interaction effect between summer school participation and SES for language usage, leading to rejection of the null hypothesis. The researcher failed to reject the null hypothesis for third grade math, as there were no significant interaction effects or main effects of the independent variables on post-test RIT scores. Participation in summer school was shown to have a significant main effect on post-test reading scores with summer school students scoring significantly lower than their non-summer school counterparts; therefore, the null hypothesis was rejected.

In grade four, ANCOVA analysis revealed a significant interaction effect between summer school participation and gender for language usage, leading to rejection of the null

hypothesis. The null hypothesis was also rejected for math as SES showed a significant main effect on post-test RIT scores, with paid lunch students performing significantly better than their free/reduced lunch peers for both summer school and non-summer school student groups.

Similar to results for reading in third grade, participation in summer school was shown to have a significant main effect on post-test reading scores in fourth grade, with summer school students scoring significantly lower than their non-summer school counterparts; therefore, the null hypothesis was rejected.

For grade five language usage students, each of the main effects of gender, ethnicity, and SES were statistically significant, leading to rejection of the null hypothesis. Ethnicity was shown to have a significant main effect on post-test math scores with White students scoring significantly higher than students of all other ethnicities, regardless of participation in summer school. The researcher failed to reject the null hypothesis for fifth grade reading, as there were no significant interaction effects.

CHAPTER 5

Discussion, Implications, and Conclusions

A review of recent literature indicated that one of the greatest problems associated with the nine-month school calendar is the learning loss associated with long periods of vacation from school. Studies showed that overall, scores on achievement tests can be expected to decline by approximately one month over the course of the summer, with math computation and spelling being most negatively impacted. Reading comprehension scores decline for all income groups, but show a greater decline for students with low SES (Cooper et al., 1996). Neither gender nor ethnicity was shown to have a significant relationship to summer learning loss.

To avoid summer learning loss, many school systems have implemented summer school programs as a cost-effective means of delivering additional services to students. Summer school programs showed a positive impact on student learning when they were appropriately focused and structured (Cooper et al., 2000). However, in 2001, Cooper cautioned that it could not be assumed that all summer school programs are effective in minimizing summer learning loss or in increasing student performance levels. Cooper (2001) further challenged,

...the existence of summer learning loss cannot *ipso facto* be taken to mean summer educational programs will be effective remedial interventions. Summer school might not change the educational trajectory of students who took part in such programs. The impact of summer educational programs has to be evaluated on its own merits. (p. 3)

In response to Cooper's challenge, this study was undertaken to better understand the effects of summer school remediation on elementary student achievement by evaluating the impact of a non-scripted summer remediation program over five years of implementation. The study compared the differences between student performance data on spring and fall administrations of Northwest Evaluation Association (NWEA) Measures of Academic Progress (MAP) for matched pairs (based on student performance on spring NWEA MAP) of second through fifth grade summer school participants and

Discussion of Findings

The results of ANCOVA analysis showed significant interaction effects between summer school participation and SES for both language usage and math in grade 2, suggesting that second grade Free/reduced lunch students responded differently than paid lunch students to summer school programming for language usage and math. While free/reduced lunch summer school students scored higher than their non-summer school counterparts on post-tests in both language usage and math, paid lunch non-summer school students performed significantly better than their summer school counterparts on post-tests in their respective subject areas. A similar interaction effect between summer school participation and SES was found for grade 3 language usage students. Third grade free/reduced lunch summer school students scored significantly higher than their non-summer school counterparts on the language usage post-test, while paid lunch non-summer school students performed significantly better than their summer school counterparts on the post-test. These results were not anticipated according to findings of the study by Cooper et al. (2000), which indicated, "...summer programs have more positive effects on the achievement of middle-class students than on students from disadvantaged backgrounds" (p. 91).

While the effects of the summer school program within this study were beneficial for free/reduced lunch second and third graders in language usage and second graders in math, paid lunch summer school students did not demonstrate as much growth between pre- and post-test administrations as their non-summer school counterparts. Clearly, summer school program design and interventions should take into consideration the SES of program participants, especially for second and third graders in language usage and second graders in math.

The researcher failed to reject the null hypothesis for reading in grades 2 and 5, as well as for math in grade 3, as there were no significant interaction effects or main effects of the independent variables on post-test RIT scores. In each case, however, there was a significant relationship between the covariate (pre-test scores) and the dependent variable (post-test scores), while controlling for the independent variables. Again, these results were not anticipated according to findings of the study by Cooper et al. (2000), which indicated,

...summer school programs focused on lessening or removing learning deficiencies have a positive impact on the knowledge skills of participants. Overall, students completing remedial summer programs can be expected to score about one-fifth of a standard deviation, or between one-seventh and one-quarter of a standard deviation, higher than the control group on outcome measures. (p. 89)

Participation in summer school was shown to have a significant main effect on post-test reading scores in grades 3 and 4, with summer school students at both grade levels scoring significantly lower than their non-summer school counterparts. These results suggest the need to carefully scrutinize and revise summer school programming for reading for grades 3 and 4 to optimize the potential benefits for program participants.

While no studies were found in recent literature that exclusively examined the impact of gender on summer learning loss, Cooper et al. (1996) investigated the impact of both gender and race as part of their meta-analysis. According to their findings, “Neither student gender nor student race appeared to have a consistent moderating influence on the effect of summer vacation” (p. 262).

Similarly, Alexander et al. (2001) found no significant influence of gender on summer learning. They noted, “But the seasonal adjustment has its greatest effect on the size and patterning of SES differences, with achievement disparities larger altogether across socioeconomic lines than across racial/ethnic and gender lines” (p. 181).

In the current study, ANCOVA analysis for grade 4 language usage revealed a significant interaction effect between summer school participation and gender, suggesting that fourth grade males and females responded differently to summer school programming for language usage. While female non-summer school students scored higher on the post-test than male non-summer school students, female summer school students performed significantly better on the post-test than male summer school students. This suggests that summer school program design and interventions for fourth graders in language usage should take into consideration the gender of program participants.

As may have been anticipated from recent literature, SES was shown to have a significant main effect on post-test math scores in grade 4 with paid lunch students scoring significantly higher than their free/reduced lunch counterparts. These results demonstrate the significant effect of SES on student performance for fourth grade math students, and underscore the need to take into consideration the SES of students when designing summer programs and interventions.

Each of the main effects of gender, ethnicity, and SES were statistically significant for grade 5 language usage students. Females significantly outperformed males on the language usage post-test without regard to summer school participation. White students significantly outperformed students of all other ethnicities on the language usage post-test. Paid lunch students also scored significantly higher on the language usage post-test than their free/reduced lunch peers. It is important to consider each of these factors when designing effective summer school language usage programs and interventions for fifth grade students.

It is also important to consider ethnicity when designing effective summer school programs and interventions for fifth grade math students as ethnicity was shown to have a significant main effect on post-test math scores. As in language usage, White students significantly outperformed students of all other ethnicities on the math post-test, without regard to summer school participation.

Implications and Suggestions for Further Research

Based on the review of recent literature in Chapter 2 and the results of the analyses of data in Chapter 4, the design and interventions of the non-scripted summer school program in the current study are in need of review, revision, and refinement at all grade levels (2–5) and in all subjects (language usage, math, and reading). Characteristics of effective summer school programs are those described by Denton (2002b) and reflect the recommendations of Cooper (2001) to policy makers. Table 27 presents a side-by-side comparison of characteristics of effective summer school programs to the characteristics of the summer program within this study.

Table 27

Comparison of Effective Summer Programs to EACS Summer Program

Effective Summer Programs	EACS Summer Program
Integral part of a year-round program	Remediation provided over the summer
Available to all failing students at no cost	Available to all students at no cost
Minimum of 60 hours of instruction	Maximum of 60 hours of instruction
Abbreviated school day over extended number of days	Abbreviated school day over extended number of days
Small teacher to student ratio	Teacher to student ration = 1:15
Individualized instruction through the use of innovative and creative teaching strategies	Individualized instruction encouraged through required documentation of lesson plans and teaching strategies
Emphasis: reading and math	Emphasis: language usage, reading, math
Teachers have training and/or proven ability to help struggling students	Teacher selection based upon contract requirements
Rigorous evaluation of teaching strategies	Teaching strategies self-monitored and reported by teachers
Rigorous evaluation of student achievement	NWEA Map pre- and post-testing
Active parental support	Parental consent required
Regular student attendance	Attendance encouraged and documented
Transportation provided	Round-trip bus transportation provided
Food service at program sites	Breakfast provided for all students
Local control of program delivery	Building-level control of program delivery

In addition to the programming and intervention considerations identified through ANCOVA analyses, the following actions are recommended based on the differences noted in the comparison of effective summer school programming to that of the EACS summer school program:

1. Redefine summer school programming as an integral part of a year-round program. NWEA MAP pre- and post-testing already occurs during the course of the regular school year. While the results of the spring pre-test are made available to summer school teachers, there is a need for collaboration between regular classroom teachers and summer school teachers in order to provide appropriate, targeted instruction from a different perspective. Such collaboration should occur not only prior to summer school, but at the beginning of the school year after the summer session between the summer school teacher and the classroom teachers for the new school year.
2. Within budgetary constraints, there should be a minimum (as opposed to the current maximum) of 60 hours of instruction over the course of the summer school program.
3. While respecting the contract agreements that exist regarding the hiring of summer school personnel, those individuals who have training or proven ability to help struggling students should be given highest priority in the summer school teacher selection process. In the absence of prior training or proven ability to help struggling students, professional development in that area should be required.
4. While summer school teachers are not subject to the formal evaluation process, there should be some provision for informal observation by the school administrator or summer school program coordinator to provide objective feedback regarding the level and quality of instructional strategies implemented in the summer school classroom.

Additionally, collaboration time among summer school teachers would allow for the productive exchange of ideas and strategies that have proven successful in other classrooms.

5. Parental consent to participate in the summer program neither implies nor ensures parental support of the program. A pre-summer school parent–teacher compact should be developed that clearly outlines expectations for parental involvement and defines what parents can expect from the summer program, as well as from their students. Teachers should maintain regular contact with parents according to an established timeline, with additional contact as necessary to serve the needs of individual students.
6. Pre- and post-summer school surveys of parents, teachers, and students should be developed to lend additional insight into the perceived effectiveness of the summer program, as well as to elicit suggestions for improvement.

Throughout the course of the study, other questions have arisen that could be addressed through further analysis.

1. After controlling for gender, SES, and ethnicity, was there a significant difference in student achievement for students who participated in multiple years of the summer remediation program?
2. Students participating in the summer program at the beginning of the study (2003) would be high school students in grades 9–12 during the 2009-2010 school year. Does participation in a summer remediation program in grades 2–5 impact achievement levels in high school?

3. Does teacher experience level, defined by either years of experience and/or targeted professional development in dealing with struggling students, impact student achievement in a summer remediation program?

Conclusion

One aspect of this study's significance, as noted in Chapter 1, lies in its attempt to bridge the gap between research findings and real-world implementation. It serves as a model and a call to action for those educational administrators who are ready to engage in an objective, introspective analysis of program effectiveness and are willing to embrace whatever shifts in operational or instructional paradigms may be needed for improvement.

As evidence, a follow-up to this study included an analysis to explore the percentage of summer school students who showed improvement between pre- and post-test scores. Results indicated that nearly 60% of grade 2 students and more than 54% of grade 4 students showed some level of improvement for language usage, math, and reading. For grade 3, more than 46% of students showed improvement in language usage and reading, while over 55% showed improvement in math. Results for grade 5 showed that over 41% of students showed improvement in language usage and reading, and 49% showed improvement in math.

These performance percentages may be typical of those reported to administrators, staff members, stakeholders, and school board members. These successes are certainly important to the individual students, and within that context should not be minimized; however, these results do not accurately reflect why these students showed improvement. They do not reflect that within this study, 64% of matched pair non-summer school students in language usage for grade 2 showed improvement nor do they reflect that 74% of grade 2 non-summer school students

showed improvement in math. The differences between the percentages of summer school and non-summer school students showing improvement between pre- and post-test RIT scores vary.

All of this information underscores an important point: Investigating and reporting descriptive statistics at the end of a summer program recognizes and celebrates the successes of groups of students. This information may also show some areas of needed improvement. What this information does not show is a causal relationship between summer school attendance and student achievement. More importantly, it stops short of identifying specific factors that, when appropriately addressed, would increase the effectiveness of programming, and allow even more students to experience the benefits of such programming.

As schools or districts choose not to evaluate the effectiveness of their summer programs, they are at risk of under-serving their students, as Denton (2002a) noted:

Research clearly shows that quality summer programs for struggling students are essential to closing the gaps, and any school that does not offer such programs essentially gives up on some students. Summers without meaningful learning doom some students to failure. (p. 12)

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APPENDIX A: PERMISSION GRANTED TO DO RESEARCH



EAST ALLEN COUNTY SCHOOLS

1240 State Road 930 East
New Haven, Indiana 46774
Telephone 260-446-0100
Facsimile 260-446-0107

December 18, 2008

To Whom It May Concern:

On behalf of East Allen County Schools and the Office of the Superintendent, I hereby grant approval for the study, *Summer learning loss: The Influence of summer school programs on student achievement in language usage, math, and reading*, to be conducted by Bradley R. Bakle. The study is appropriate for its population as it will examine the district's summer school program over a five-year period and will provide an in-depth evaluation of program effectiveness. The results of the study will be instrumental in identifying areas of the summer school program that are in need of improvement. Further, it will yield insight into the potential impact of gender, ethnicity, and socio-economic status on summer learning, thus allowing us to revise our summer programming policies and strategies to target the curricular and instructional needs of our students more effectively. On a broader scale, the study will serve as a model for similar school districts as they begin to examine and evaluate the effectiveness of their own summer school programs.

If there are any further questions, please contact me at the phone number listed above, or via email at knovotny@eacs.k12.in.us.

Educationally yours,

A handwritten signature in cursive script that reads "M. Kay Novotny".

M. Kay Novotny, Ed.D.
Superintendent

Our mission is students distinguished by achievement, skills and character.