Teacher Predictions of Student Achievement Based on Student Gender, Ethnicity and Socioeconomic Status in High School Mathematics

by

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ABSTRACT

Kim Pamela Mayo: Teacher Predictions of Student Achievement in Mathematics

(Under the direction of Dr. Barbara Day)

High stakes tests attempt to determine the level of proficiency in the basic skill areas and if the student could be successful in the next course. Existing state standards help to ensure that students have mastered the necessary skills to perform well in future courses. Students today are spending more time than ever preparing for high stakes tests—presumably a side effect of the importance placed on tests and testing today (Jones, Jones, Hardin, Chapman, Yarbrough & Davis, 1999). North Carolina End-of-Course mathematics teachers have helped to standardize these achievement tests by evaluating classroom performance with the students' actual performance on these tests (North Carolina Department of Pubic Instruction, 2005a). Many studies explain the correlation between gender, ethnicity and SES of the family (Holman, Gonzalez & McNeil, 1993; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Okpala, Okpala & Smith, 2001; Willie, 2001), but there is a gap in the research which explores the relationship of these variables to the possible significant difference between teacher-predicted grades and actual student performance.

This study analyzed Algebra II EOC scores, Algebra II course grades and teacher predicted course grades for six high schools in an urban North Carolina school district. It also analyzes the perception gap which exists between teacher predictions and actual student performance in mathematics. One-way ANOVA analyses and independent samples t-tests were computed to analyze the mean difference relationships between the variables and influences of gender, ethnicity and socioeconomic status. The quantitative

findings of this study tell us that ethnicity, gender and SES are highly predictive of student performance in mathematics. The data show that teachers are accurate predictors of student achievement and add some validation to the significance and value of teacher grading and assessment in present and future academic achievement.

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CHAPTER I

Introduction

Many believe that school improvement efforts are making a difference for students, parents and teachers in North Carolina. During the 2003-04 academic year, a record number of students scored at the proficient level or better and 75.1 % of North Carolina schools met or exceeded academic growth expectations (North Carolina Department of Public Instruction, 2005a). There was also marked improvement in the number of schools in the state meeting the federal Adequate Yearly Progress (AYP) goals--70.5% (North Carolina Department of Public Instruction, 2005a). Student scores on various high stakes tests administered in North Carolina provide the data for these conclusions. High stakes tests attempt to determine a student's level of proficiency in the basic skill areas to be successful in the next course or grade, for example. Existing state standards help to ensure that high school (and middle school) students, in particular, have mastered the necessary skills to perform well in future courses.

Students today are spending more time than ever preparing for high stakes tests—presumably a side effect of the importance placed on tests and testing today (Jones, Jones, Hardin, Chapman Yarbrough & Davis, 1999). The terms, high stakes tests, standardized tests and standardized achievement tests, will be used interchangeably throughout this study. For the purpose of the proposed study, high stakes tests would include standardized achievement tests such as the End-of-Course, or EOC test and the NC Test of Computer Skills and national assessments like the Scholastic Aptitude Test

(SAT) and the Graduate Record Examination (GRE). There are approximately 35 state tests currently administered to students in grades three to twelve in North Carolina (North Carolina Department of Public Instruction, 2005b). The EOC in Algebra I, Algebra II and Geometry are examples of standardized math achievement tests which report the students' score results in one of four achievement levels—Level I (lowest) to Level IV (highest). Mathematics teachers representing various North Carolina counties have helped to standardize these achievement tests by evaluating the classroom performance of their students against the students' actual performance on these End-of-Course tests (North Carolina Department of Public Instruction, 2005a). This, of course, places considerable importance on the grades that teachers calculate for the class. Grades and grading refers, in this research study, to yearly scores assessed by teachers based on the student's achievement in the class.

Statement of Purpose

Teachers consider assigning grades to be one of the most unappealing and dreaded aspects of the teaching profession (Terwilliger, 1977), because they may be based on many factors and variables. However, for parents, grades are one of the most direct and relevant forms of feedback on student performance available (Stiggins and Conklin, 1992). Research does show that teachers may use grades for a variety of purposes and based on a variety of factors (Blount, 1997; Senk, Beckmann & Thompson, 1997). While some teachers perceive grades as a reflection of student progress, 86% of the practicing teachers surveyed in Blount's study regard grades as a measure of student effort in class (Blount, 1997). Teacher comments recorded in the study mention those students who "put out effort…should be rewarded" (p. 330) while another teacher's comment seems to

sum up the comments of others, stating that the ability of the students and how hard they try to complete assignments is factored into the course grade (Blount, 1997). The findings also conclude that teachers view grades as a motivator; 82% of these teachers believe that students would perform minimum requirements if schools used a pass/fail system to assess student performance (Blount, 1997). Furthermore, according to Blount (1997), extra credit re-emphasizes the importance placed on grades and simultaneously, it raises the student's grade but not necessarily the student's level of learning.

Parents would expect that a student's course grade would have a strong correlation, for example, to the score the student earns on the End-of-Course test in Math for the course. But consider the research which suggests that girls tend to receive higher grades than boys in mathematics while boys score slightly better than girls on standardized tests (Ekstrom, 1994; Gavin & Reis, 2003; Ercikan, McCreith & Lapointe, 2005). When considering the grades of minority and female students in mathematics (Ercikan, McCreith & Lapointe, 2005; Stevens, Olivarez, Lan & Tallent-Runnels, 2003), the gender of the teacher was not taken into account, realizing that male and female teachers *may* differ in their perceptions of student achievement based on student behavior and performance as concluded in research by Rong (1996), Helwig et al. (2001) and Gavin & Reis (2003).

Hispanic students at all grade levels have made progress in closing the achievement gap in math through the 1980s, although the gap continued to grow in the 1990s and still exists (Stevens, Olivarez, Lan & Tallent-Runnels, 2003). Findings of Lee's research on the ethnic achievement gap (1996) did not provide a clear answer as to the factors which were believed to influence this growing gap—family conditions, socioeconomic status,

changes in youth culture and changes in schooling practices. More research must be done in analyzing this topic.

Another very important influence on student achievement is the socioeconomic status of the students and their families. There is a considerable amount of research on the impact of a family's SES on the academic success of a student (Anderson & Keith, 2001; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Okpala, Okpala and Smith, 2001). Student motivation is an important factor in the achievement of low SES students, according to the research of Eileen Anderson and Timothy Keith (2001). However, when combined with ethnicity, many researchers have discovered that African American students in low SES schools are not as academically successful as African American students in high SES schools. In addition, these students tend to have lower achievement grades and scores than Whites in the low SES schools (Kohr, Masters, Coldiron, Blust & Skiffington, 1989). Many factors influence student achievement, but the profession could benefit from more research in teacher perceptions of grading and factors such as the gender, ethnicity and socioeconomic status of students that can influence the grade the teacher puts on the student's report card.

The purpose of this study is to investigate the perception of student achievement based on student gender, ethnicity and socioeconomic status in high school math in an urban school district in North Carolina. Most of the literature reviewed for this research focused on those factors which affect testing and grades, specifically socioeconomic status of the student's family, student gender and ethnicity/race. A quantitative approach was used to research the questions posed in this study.

Major Research Question

The major research question posed is: What are the perceptions of secondary math teachers of student achievement?

Research Questions

The following questions will guide the process of inquiry:

1. What are Algebra II math teacher predictions of student grades?
2. Does the gender, race and/or socioeconomic status of the students influence teachers' perceptions of student achievement?

Definition of Terms

This section defines commonly used terms as they are used in this study of teacher predictions of student achievement.

EOC, or End-of-Course test, is a state-mandated test administered to high school students at the end of the semester. EOC test

EOG, or End-of-Grade test, is a state-mandated test administered to elementary and middle school students during the last month of the academic year. A passing score on the test is required for students to be advanced to the next grade.

Free lunch participants are those students living in a household that has a total household income at or below 1.30 times the federal poverty level, depending on the size of the household (USDA, 2007).

High stakes tests are standardized assessments designed to measure student achievement which may lead to very important consequences such as whether or not a student will move on to the next grade or receive a diploma. In this study, examples of high stakes tests include state and local standardized assessments such as End-of-

Course and End-of-Grade tests; national assessments such as the Scholastic Aptitude Test (SAT); Graduate Record Exam (GRE).

Low socioeconomic status (SES) is the status of a student who is a participant in the federal free and reduced lunch program.

Perception, in this study, refers to the teachers' intuition or impression or awareness of reality (O'Shea, 2006).

Perception gap refers to the difference between the reality and the intuitive estimation of student performance by the classroom teachers. More specifically, in this study it refers to the difference between the teachers' predicted Algebra II End-of-Course grade and the grade the students actually earned for the Algebra II class.

Reduced lunch participation refers to students living in a household that has a total household income at or below 1.85 times the federal poverty level, depending on the size of the household (USDA, 2007).

CHAPTER II

Literature Review

Relevant literature provides a basis for the proposed study. This chapter will begin with a discussion of grades, grading and testing to provide an overview and place these topics in context. The literature is concentrated in four main areas —external factors affecting grades and testing; school-related factors, teacher perceptions of student performance and student-related factors. The subtopics further organize the relevant literature. Following the discussion of each area, the chapter will conclude with a summary linking the importance of the literature to the proposed study.

Grades, Grading & Testing

Teachers consider assigning grades to be one of the most unappealing and dreaded aspects of the profession (Terwilliger, 1977). Grades should exclude student behavior and effort, and should mean the same for all students (Natriello, 1992). Secondary teachers of mathematics, science, social studies and language arts report that assessment for the purpose of grading can require as much as a quarter of their instructional time for some classes, but offers parents the most direct and relevant feedback on student performance (Stiggins & Conklin, 1992). H. Parker Blount's literature review (1997) provided references to relevant research on grading, pointing out that grades are not intended to be used to motivate students, reflect student personalities or attendance (Anderson & Wendel, 1988). Generally, grades provide parents with information on student learning and are the most frequently and consistently used form of assessment

(Senk, Beckmann & Thompson, 1997). For the purpose of the proposed study, high stakes tests would include standardized achievement tests (e.g., End-of-Course tests and the NC Test of Computer Skills) and national assessments such as the Scholastic Aptitude Test (SAT) and the Graduate Record Examination (GRE). The terms, high stakes tests and standardized tests, are used interchangeably throughout this study.

External Factors Affecting Grades and Testing

Accountability & standards. The Coleman Report of 1966 changed testing accountability in the United States. The document, the response to the Civil Rights Act of 1964, reported that the average minority student achieved less than the average White student. In addition, Coleman reported that minority students were more affected by the quality of their schools than White students. Many reform programs and policies resulted from Coleman's report. School leaders and teachers are issued mandates and policies which guide instruction, recommend accountability and help teachers educate students. In many instances educators have little or no control over these mandates and conditions that exist. High stakes testing is one fairly recent example of an education accountability mandate. Some of the relevant research focuses on the standards that form the basis for such tests. Ellen Wright (1998) discussed the efforts of California educators and policy makers attempting to connect teaching with testing by creating the Academic Standards Commission, an advisory board to the California State Board of Education. It is their charge to set academically rigorous content and student performance standards for each grade level, beginning with language arts and mathematics which will make them competitive with other nations (Wright, 1998). According to Wright, recent international standards research concludes that some U. S. curricula incorporates so much content that

students are not developing a deep understanding of key concepts while other researchers have concluded that U. S. curricula focuses on the same or similar concepts year after year. Some legislators place a lot of emphasis on test scores and believe that state and national assessments are linked to strong standards that serve as the foundation for the high stakes tests. Student performance on standardized achievement tests is placing more pressure on teachers and schools that must prove, in essence, their effectiveness (Popham, 1999). According to others, accountability forces teachers to focus on the high stakes tests and student scores on these tests at the cost of teaching more useful and relevant skills such as higher-order thinking and "lasting learning"—topics which should be the focus of learning in this millennium (Day, 1999).

What happens to schools that do not "make the grade"? Jones, Jones, Hardin, Chapman, Yarbrough and Davis (1999) cite the wisdom of Dr. Seuss (1995):

> All schools for miles and miles around
> Must take a special test.
> To see who's learning such and such
> To see which school's the best.
> If our small school does not do well,
> Then it will be torn down,
> And you will have to go to school
> In dreary Flobbertown. (p. 21)

High stakes accountability programs like North Carolina's *New ABCs of Public Education*, usually referred to as the ABCs, seek to improve student performance by impacting curriculum, instruction, personnel and assessment (Jones et al., 1999). Generally, these programs offer more local control and flexibility in spending state funds and waiving some state laws and regulations, but must endure the strict control of student achievement through high stakes testing (Jones et al., 1999). A school's performance is evaluated based on its previous performance and the statewide average test scores and

schools are labeled as *exemplary, meets expectations, adequate performance* or *low performance* (Jones et al., 1999). Teachers at exemplary schools enjoy the benefit of $1,500 teacher bonuses while low performing schools work with assistance teams, endure personnel and administrator shifts, take teacher competency tests and they live with the embarrassment of not doing a good job (Jones et al., 1999). To comply with the testing accountability and avoid the stigma of being labeled a low performing school, elementary educators spend a large part of the instructional year planning and practicing for the End-of-Grade (EOG) tests. Jones et al. surveyed 470 certified elementary teachers representing 16 schools and five school districts across North Carolina to get their views on the ABCs accountability program and the amount of instructional time they use to teach test-taking skills and strategies. Eighty percent of the teachers surveyed responded that their students are practicing for EOG tests during more than 20% of their instructional time; 28% of the teachers indicate that these students spend 60% of their instructional time practicing and preparing for tests in general. The data show that students today are spending *more time than ever* preparing for tests which is a definite result of the importance placed on these tests (Jones et al., 1999). Educators are no longer in control of the schoolhouse, according to George Madaus, as cited in Jones et al.'s work; he concludes that the high stakes testing issue has reassigned control from local boards of education back to the state board of education which has the authority to close the doors of a school based on poor EOG scores (Madaus, 1988).

The Bush Administration's No Child Left Behind (NCLB) Act requires that students in grades three through eight be tested in reading and math; a science test will be added to the measure in 2008. David Sadker and Karen Zittleman, authors of Test Anxiety: Are

Students Failing Tests or Are Tests Failing Students? (2004) explain why NCLB testing will be ineffective. According to these authors, high stakes tests *can* contain costly errors—for students and for testing agencies. The National Board on Educational Testing and Public Policy reported 50 "high-profile" testing errors from 1999 through 2002 (Sadker & Zittleman, 2004). Possibly more alarming and relevant is Sadker and Zittleman's belief that having only one version of a standardized test for all students, regardless of exceptionality, English language proficiency, ethnicity and/or district demographics is not a fair assessment of student performance because it does not account for the diversity and socioeconomic status of the school-community. Research has shown that both factors have an effect on student performance (Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Okpala, Okpala & Smith, 2001).

Tests & scores. There is also a growing body of research attempting to analyze various aspects and characteristics of these tests to help support and/or explain the testing results (Hewitt & Homan, 2004; Popham, 1999). Course grades and standardized test scores, are only two methods used to determine student achievement and placement in schools, and they are particularly widely debated topics in education (Munk & Bursuck, 2001). Dennis Munk and William Bursuck contributed to the relevant literature on grades with their study, What Report Card Grades Should and Do Communicate: Perceptions of Parents of Secondary Students With and Without Disabilities (2001) focusing on determining grades for mainstreamed exceptional students and the need for grade adaptations because of student exceptionalities. A questionnaire instrument was designed and field-tested on two occasions to establish its validity and reliability. The instrument consists of ten possible purposes for report card grades and asks parent participants to

rate them from 1 to 10 (with "1" being *most important*); participants were also asked to rate how effectively report card grades meet each of the purposes as they relate to their student's report card grades, using a Likert scale of 1 to 6 (with "1" being *very effective* and "6", *very ineffective*). To gather additional information, parent respondents could include more information in the comments section before mailing the survey back to the researchers. A stratified sample of high achieving, average achieving and low-achieving high school students without disabilities was used along with a sample of students receiving special education services at school. The limited sample and low return rate (only 163 surveys or 28%) has negative implications for generalizability of Munk and Bursuck's results, but they came to several interesting conclusions based on their sample, and their findings were consistent with those of an earlier study reported by Bursuck, Munk and Olson (1999). The findings suggest that parents do prefer grade adaptations that directly relate to their child's abilities and which are sensitive to changes in their personal performance and prefer that the criteria for these adaptations be determined with the teacher ahead of time. In addition, parents of students with and without disabilities want grades to have true meaning. In other words, none of the parents surveyed considered a reduction in workload or simply passing students as an acceptable or desirable grading adaptation.

Middle and high school students, teachers and parents wait anxiously for the results of End-of-Course (EOC) tests each semester. The North Carolina End-of-Course test was initiated based on the mandatory implementation of the Basic Education Program. It required that the core curriculum for all North Carolina public school students be implemented and assess knowledge and skills of individual students and student groups

in the state (North Carolina Department of Public Instruction, 2004). Questions that may arise after reviewing the scores are, "How is the score determined, and what does it mean?" There is a large body of literature that conceptualizes the debate about how to establish the cutoff scores for these and other student assessments. Guskey (2001) says, "Typically, these debates focus on what percentage of items students should be expected to answer correctly in order to have their performance judged 'proficient' or 'competent'" (p. 534). If higher cutoff percentages imply more rigorous standards and higher expectations, it is possible that raising the expectations for student performance may depend on the level to which the cutoff percentage is raised. Furthermore, Guskey (2001) contends that establishing the appropriate cutoffs should be determined by a combination of "teacher judgments of the importance of the concepts addressed and consideration of the cognitive processing skills required by the items" so that the grades better reflect the quality of student thinking instead of only the number of points accumulated (p. 539). This supports a later discussion in this literature review on the importance and value of teacher perceptions about grades and testing.

The validity and reliability of a standardized test holds serious implications for the interpretation of the resulting data. Hewitt and Homan (2004) examined major standardized tests for individual item readability level and item difficulty. Well known in their field, these researchers developed the Homan-Hewitt Readability Formula for individual test items in earlier empirical work to address previous concerns about the weaknesses of readability formulas and instead establish a reliable measure used by many in the field today (Bertram & Newman, 1981; Hewitt & Homan, 2001). In their more recent research, Readability Level of Standardized Test Items and Student Performance:

The Forgotten Validity Variable (2004), they wanted to determine if test items indirectly penalize students with reading problems by evaluating missed items for readability level. They contend that this could affect test reliability and validity. They focused on selected items from the Social Studies subset and Reading Comprehension subset of the Comprehensive Test of Basic Skills, Survey, Form A (CTBS) for grades three, four and five and determined the readability levels of a total of sixty social studies items using the Homan-Hewitt Readability Formula. The CTBS, a nationally norm-referenced achievement battery for assessing basic skills was administered to 7,351 third graders, 7,051 fourth graders and 6,854 fifth graders in April of 1998 in all elementary schools in a large urban school district. The scores from the comprehension and social studies subsets were analyzed and divided into high and low reading comprehension (difficulty) categories for the third, fourth and fifth grade students. A separate measure, the Pearson Product Moment, was used to correlate the readability level and difficulty level as well as the reading comprehension level and difficulty level. One of their conclusions supports their research question and indicates the higher the readability level of the test item, the more students tend to miss the item (Hewitt & Homan, 2004). To summarize, it suggests that high stakes tests measure more than student achievement. In addition, considering the weight placed on high stakes testing, educators and policy makers must allow for such testing variables and the threats to the validity of the scores as a valid measure of student achievement.

Measuring success. Joseph Casbarro (2005) conceptualized in The Politics of High-Stakes Testing that testing has become a political issue that in part determines how schools are judged today. Many in the community believe that a school's success is

measured mainly by the test scores it reports. High scores mean smarter students and better schools have the better test scores. Poor performance on these standardized tests holds consequences for students, such as failure and grade retention, as well as for the schools—loss of funding, lower teacher bonuses and labeling as a low-performing school. He refers to it as the politics of coercion when politicians use financial incentives and school recognition to reward and punish schools based on test results, and, he claims, schools can be compared to test prep centers. Casbarro, an Assistant Superintendent in an upstate New York school district, contends that it may be unfair to evaluate schools on test results alone. The politics of perception has politicians using test scores as a campaign platform, and the public is told that high stakes tests are accurate measures of student ability and skill--better schools have better scores. Finally, the politics of performance find state departments of education working with the testing results; compiling comparative data; disaggregating the data for subgroups; setting yearly progress targets, baselines and guidelines and, in some instances, developing and analyzing tests. Their objectives are determining the good score and meeting standards. Casbarro's frustration with the politics of high stakes testing is evident and his advice to school leaders is relevant to this literature review. He encourages these leaders to analyze and share information on performance trends and do a better job of explaining what test scores really communicate about the test, alignment with curriculum taught, student preparedness *and* student performance. But most importantly for this review of the literature, Casbarro recommends that school leaders "emphasize that state-mandated tests are only a snapshot in time and cannot totally reflect the depth and breadth of a ten-month academic program" (p. 19). Student achievement is the result of a multiple

assessment approach; teachers use quizzes, projects, portfolios, homework and other activities to measure student performance and achievement. Some school districts integrate technology to assist in student achievement and assessment. Brown and Boshamer (2000) studied the impact of computer-assisted instructional (CAI) software which was used with elementary and middle school students to enhance their knowledge of math and increase achievement. The software package provided instruction in mathematics ranging from basic concepts to high school algebra and geometry. The sample of 515 elementary and middle school students of various ethnic groups and socioeconomic status used the software a minimum of one 45 minute period per week (an average of 23 hours of computerized instruction during the academic year for each student) along with the course text and teacher instruction. A control group of similar academic and grade characteristics was part of the study. Each group was administered an End-of-Grade or End-of-Course standardized test as a pretest and again as a post-test. Statistical analysis of the data show that African American 4th grade students who used the CAI software made greater progress than those African American 4th graders in the control group. The software could improve the rate in which African American students learn the mathematics. African American students who did not use the CAI program scored the worst while those who used the program made the most improvement. The White students in the control group showed higher test scores on the post-test and greater gains on the post-test than any African American students in the control group. If used and integrated appropriately, such technology or alternate methods of assessment may help close the achievement gap between African American and White students.

The teacher's perception of grades and student achievement is a key factor in establishing student achievement. Creative teachers and administrators can and usually do find ways to work through situations outside of their direct control and adapt them to improve and enhance the instruction and student achievement.

School-related Factors

Parental involvement & empowerment. The literature suggests that there are factors that schools and especially teachers can control which may affect grades and student achievement. James Griffith's study, Relation of Parental Involvement, Empowerment and School Traits to Student Academic Performance, (1996) and several others (Reynolds, 1992; Reynolds, Weissberg & Kasprow, 1992) examine the affect of parental involvement and parental empowerment on student academic performance. Griffith's (1996) empirical research specifically examined parental involvement, parental empowerment, student achievement and the criterion value that gauges how well a school is meeting instructional standards. The findings tell us parental involvement is an important factor in student academic performance. In addition, he concluded that schools with smaller, more experienced faculties (four or more years of experience) have greater parental involvement. Also, parents were not as involved and were not as certain instructional standards were being met in schools with higher percentages of minority teachers (African Americans and Hispanics) and students participating in free and reduced lunch programs.

Other characteristics of the school, such as class size, school size and English as a Second Language (ESL) population, did not seem to affect student performance. Many educators would concur with Griffith's findings and would probably agree that this is true

today. Realizing the impact parental involvement may have on the achievement of students and the school, teachers and school leaders must incorporate more effective strategies to increase their participation, especially for secondary level and minority students. Teachers' low expectations and a negative school environment have an affect on student achievement (Moote & Wodarski, 1997) as well as positive teacher-student relationships (Niebuhr & Niebuhr, 1999).

Grades & assessments. To better understand grading, the findings of H. Parker Blount's study (1997) were analyzed in which 58 practicing teachers were interviewed one-on-one to collect data on their perceptions of grades and grading and to gain insight in teacher practices on grading. The testing protocol was established, and twelve open-ended questions were asked of each participant in the same order. The sample group represented teachers of varying experiences (one to forty years of teaching experience, averaging thirteen years); there were forty-four females. Thirty-seven of the teachers taught in secondary schools; eighteen in middle schools and three in elementary schools. The data show that grades are used for a variety of purposes. Blount was not anticipating the conclusion that the participants did not consider grades an assessment of students' performance, noting that they consistently wrote, "I don't give grades; students earn grades" (p. 329). Grades were viewed as feedback, essential to learning and 86% of the participants responded that effort is a direct influence on grades. It was not at all surprising that grades seem to "transcend the importance of learning" (p. 331). The majority of the teachers in the study also regard a student's grade as the perception of what the student earned, though not always what he or she has learned.

Taking another look at grading, Senk, Beckmann and Thompson (1997) interviewed and surveyed 19 math teachers representing five high schools in three states to determine types of assessments used for grading as well as the most frequently used assessment tools in high school math—Algebra, Geometry, Advanced Algebra, Trigonometry and Precalculus. The findings imply that the most frequently used assessment tools were written tests and quizzes, determining about 77% of the students' grades (Senk et al., 1997). Homework was the third most frequently used assessment tool ahead of written reports, oral reports, writing assignments, personal interviews and notebooks. Although most of these math teachers view tests as the most informative assessment, followed by writing assignments and quizzes, the best tool for evaluating a student's day-to-day performance is the quiz. *Performance-based* tests are good because they require students to construct their own learning, scaffolding on what the instructor teaches (Mitchell, 1997). Incorporating various types of assessment in instruction may be more challenging and possibly time-consuming for teachers, but research findings show that some students, particularly girls, are more successful when teachers use alternative assessments and activities which support a variety of learning styles (Gavin & Reis, 2003). Day (1999) describes two main viewpoints relating to assessment—both equally necessary and valuable. The constructivist instructional-reform view centers on students mastering an objective before moving on to another; on how objectives are delivered and what is taught. In this view, the teacher and the student benefit from the learning experience. In contrast, the measurement/technical-quality viewpoint focuses on the reliability and validity of assessment and its importance to using the data in data-based decision making and tends to relate more to high stakes accountability (1999). Holman, Gonzalez &

McNeil (1993) examined demographic and testing data for 363 fifth grade students in a Texas border area to determine if their personal characteristics—i.e., SES, gender and ethnicity were predictive of their performance on the Texas Assessment of Academic Skills (TAAS). Ethnicity and socioeconomic status were found to be positively predictive of student performance on the TAAS. They concluded that there was a significant difference in the performance of White students from higher or lower socioeconomic families and Hispanic students from higher or lower socioeconomic backgrounds. For these groups, students from higher SES families were more likely to achieve a passing score on the TAAS. This was not found to be true for African American or Asian fifth graders in their study. In addition, statistically, gender was not determined to be predictive of students' performance on the TAAS.

Scheduling. Lois-Lynn Stoyko Deuel (1999) explored the effects of a school's schedule on student achievement. The Broward County, Florida district in her study was using a more traditional six period day schedule which resulted in 180 hours of instruction per course. With a renewed district goal to enhance student achievement and the effectiveness of the school, reform efforts incorporated a shift from the six-period day to block scheduling or 4x4 scheduling in ten of the district's 23 high schools. In the block high schools, each semester students take four different classes that meet for ninety minutes, and therefore, have the opportunity to earn eight high school credits per year. It averages out to 135 contact hours per course per year and could yield up to 32 credits over a student's four years in high school. Data for Deuel's study were gathered using a teacher survey, telephone interviews of school administrators and student records from pre-block implementation in the 1994-95 academic year through one year after the

implementation of blocks in selected schools during the 1996-97 school year. The researcher contrasts these two schedules using student performance measures—performance on standardized tests, student course grades and grade distributions in both settings. Data analysis results show that a significantly higher percentage of block scheduling students earned grades of "C" or better in advanced Math Level I and II courses, and students in block schedule situations earned more grades of "A" than the non-block students.

High school reform efforts are occurring around the nation as educators are trying to close the Achievement Gap, enhance student achievement and better address the needs of changing student populations. Opponents of block scheduling could cite several reasons why it may actually hinder student achievement. For example, the semester-long period between the end of a fall Advanced Placement (AP) class and the administration of the AP exam is cause for concern. The debate on block schedule effectiveness will continue long after this proposed study is completed, but for this researcher, the benefits of alternative scheduling outweigh the difficulties with it. It is yet another factor which schools may use to enhance instruction and student achievement, especially for girls as the research shows, and, furthermore, research shows that it may have positive implications and offer new opportunities for improving discipline and attendance; recovering credits; allowing for better focus on four courses versus six or seven; pursue electives and other areas of interest in high school; and allowing students to stay on track academically and graduate in four years (Deuel, 1999; Eineder & Bishop, 1997). As more and more middle and high schools adopt block scheduling, it provides a great opportunity to enhance mathematics skills by taking advantage of the longer class periods

and more concentrated learning to incorporate alternate assessments; technology integration; cooperative learning and other group activities such as enrichment clusters which allow students with common interests to share as part of the instructional program (Gavin & Reis, 2003).

Teacher expectations. Research shows that one of the most influential persons affecting student academic performance *is* the classroom teacher (Parsley & Corcoran, 2003) who should be attuned to what he/she can do in the classroom to enhance student success and learning. Parsley and Corcoran suggest teachers should help students develop an internal locus of control—a feeling that their success is within their control by teaching engaging lessons, providing a stimulating and nurturing environment and allowing students some choice in assignments and activities. According to Bempechat (1999) (as cited in Parsley and Corcoran's (2003) literature review) having high expectations for all students, especially those at-risk, helps them understand that all students can learn and succeed.

Conley (2005) discussed a positive expectation view and a negative one. A positive view by teachers requires a positive interaction with students which enhances learning and sets high expectations for their learning. Teachers who have more negative expectations of students usually have larger numbers of students who are *at-risk* of academic failure and who have low expectations of themselves. Conley's research included an experimental teacher group and a control teacher group. Each was administered a pre-test and a post-test. The experimental group met each week of the academic year to discuss and focus on mastery learning procedures for reading comprehension. The control group of teachers did not have the in-service experience. At

the end of the school year, the experimental teacher group showed significant reading comprehension gain scores, twice the gain of the control group, on the *Gates-MacGinitie Reading Test*. Just as important was the resulting increased instructional time the experiment teacher group had as well as the higher achievement expectations they had for their students. The research concluded that teachers do make a difference and can change their expectations and behaviors to enhance the learning outcomes for their students (Conley, 2005)

Teacher Perceptions of Student Performance

Teacher perceptions of student performance could be of predictive value in a variety of areas, for example, in helping to determine a student's future aptitude or coursework (Casbarro, 2005; Sparks & Ganschow, 1996; Teisl, Mazzocco & Myers, 2001). But to what extent are grades assigned by teachers predictive of students' achievement on high stakes tests? Some research studies conclude that teacher ratings of student performance are superior to screening tests used in some disciplines (Coleman & Dover, 1993), but there is need for additional research in this area combined with other factors which also influence student performance in mathematics, in particular.

Jawanza Junjufu researched the effect of gender on learning styles and teacher expectations based on ethnicity, particularly relating to African American males. In his research (2002) he analyzed how African American teachers socially construct expectations of their students which were not based solely on academic standards and unbiased perceptions of the student. He believed that teachers tend to impose influences outside of the realm of education to assess how they perceive their students and implement instructional strategies with African American students. According to

Junjufu, educators must acknowledge the culture and racial differences and how that affects the classroom; teachers are not fair to students, according to Junjufu, if they do not take into account a student's race, ethnicity and culture. A student's race, ethnicity and culture are instrumental to the formulation of a student's identity (Junjufu, 2002).

Perceptions based on gender. A great deal of research has been conducted relating to the influence of gender on student grades (Ekstrom, 1994; Ercikan, McCreith & Lapointe, 2005; Helwig, Anderson & Tindal, 2001; Holman, Gonzalez & McNeil, 1993; Keller, 2001; Sparks & Ganschow, 1996; Tournaki, 2003). Ekstrom (1994) cites the research of others (Coleman & Dover, 1993; Ekstrom, Goertz & Rock, 1988) who conclude that girls receive higher grades than boys. Moreover, the findings of others in the field, such as Gavin and Reis (2003) have posited many possible reasons why girls may have higher grades in mathematics, but score lower than boys on math achievement tests. The research of Richard Sparks and Lenore Ganschow (1996) focuses on the relationship between the teacher's perception of ninth and tenth grade female students' foreign language skills, student characteristics and their foreign language aptitude and performance on tests of native language skill. They conclude that foreign language students have different levels of native language ability and aptitude; furthermore, the students' native language ability and aptitude for foreign language is reflected in the academic skills perceived by the teacher. "A teacher who recognizes that language differences might affect his or her perceptions of a students' affective characteristics is likely to respond more supportively and positively to a student than a teacher who believes that the student lacks motivation, has a poor attitude, and exhibits foreign language anxiety" (Sparks & Ganschow, 1996). Tournaki (2003) examined gender,

reading achievement, social behavior and student attentiveness in her study to determine how these student characteristics influence the teachers' predictions of student success. The data were gathered from approximately 385 New York City teachers who were given one of thirty-four versions of a case study along with a survey and a short demographic questionnaire. The results of Tournaki's study shows that the four student characteristics do affect the teachers' predictions of students' academic and social success which can have implications for special needs students who may be at greater risk for failing in a mainstreamed classroom setting (2003). However, the limitations of Tournaki's study, namely the use of hypothetical students in the case studies and the specific urban geographic area of the sample may affect the generalizability of the results and provide an opportunity for future research in this area.

Perceptions based on expectations & behavior. The educator who does not permit his/her expectations of students to influence the treatment of kids is considered fair. Which other characteristics of teachers may offer insight into which teachers will treat their students differently and which will not? Kyunghee Lee's study (1996) seeks to determine if teachers' theories of intelligence predict how they will treat their students. According to Lee, a teacher could be an entity or incremental teacher based on whether they see intelligence as a "fixed versus a malleable ability" (p. 1) which then determines treatment behavior patterns (Lee, 1996). They formulate the educational goals that serve as the basis for determining the perceived ability of their students. To further clarify, entity teachers would consider a test as a performance goal that assesses intelligence and student competence while the incremental teacher would view the test as an opportunity to improve or adapt their understanding to acquire new skills or otherwise enhance their

knowledge. The first step for Lee was to use the Teachers' Implicit Theories of Intelligence Questionnaire to determine whether 200 Korean teachers represent entity or incremental teachers (Lee, 1996). They are then asked to respond to a prompt that describes a student in need of counseling; teachers then need to predict how the students will perform. In addition, these teachers are provided one of the student's math problems and are asked to grade, provide feedback, recommend additional assignments (and reasoning for the recommendation) and discuss whether or not tracking is appropriate for the student. The findings show that teachers do show differential treatment based on their theory of intelligence—entity teacher were more unfair and their classrooms more negative than incremental teachers (Lee, 1996). While Lee's study (1996) does not specifically explore classroom activities used by entity and incremental teachers or actual treatment of the students, more research must be done to help educators effect fair, positive classrooms where good performance is rewarded and students have the opportunity to build on their positive self-efficacy.

James Teisl et al.'s (2001) findings show a significant correlation between kindergarten teachers' prediction of low academic performance in first grade and scores on outcome measures in mathematics and reading. Although the researcher's small sample size does not allow the generalizability of the study's findings, Teisl et al.'s longitudinal study did conclude that teacher perceptions of how much students were learning accurately predicted the students' performance. In addition, Teisl et al.'s (2004) data show that there is evidence that teachers are better predictors of academic variables than behavioral and social variables for kindergarten and first grade students. Replication of the study and elimination of the various limitations would be of value to educators.

This study helps to validate the value and significance of teacher grading and assessment in present and future academic achievement.

Student-related Factors

Student motivation and effort. Discussions on student performance are not complete until those variables and factors that directly affect student learners are reviewed; they could either encourage or negatively impact student achievement. The motivation and effort of students are important to student success and to educators. Susan Brookhart's longitudinal study, Determinants of Student Effort on Schoolwork and School-based Achievement (Brookhart, 1998) replicates an earlier study (Natriello & McDill, 1986) with the inclusion of another variable—students' perceptions in determining effort and achievement based on English grade point average (GPA). The sample of approximately 3,000 7^{th} and 10^{th} grade students in U.S. public schools is stratified by geographic region and degree of urban development. At the end of the four year study, the researchers conclude that the findings are significant because they indicate that student perceptions of their ability to meet challenges may be as difficult as the challenges themselves.

Personal qualities & gender. Parsley and Corcoran (2003) conclude that the students' attitude toward their learning is strongly correlated with school performance while the students' socioeconomic status (SES) may make it difficult for them to get the resources necessary for their success. There is literature that specifically examines the anxiety of girls in mathematics (Gavin & Reis, 2003; Leedy, LaLonde & Runk, 2003). M. Katherine Gavin and Sally Reis, in Helping Teachers to Encourage Talented Girls in Mathematics, discuss the anxiety girls may feel toward mathematics and believe that girls may not receive as much encouragement to achieve in mathematics as boys (2003).

Perhaps, as they contend, the reason most girls do not excel in math is that they are not expected to excel in this discipline. There is a large body of research on the contention that boys are better in math than girls and that mathematics is a male-dominated field (Ekstrom, 1994; Gavin & Reis, 2003; Leedy, LaLonde & Runk, 2003; Tartre & Fennema, 1995). As Gavin and Reis contend, "stereotypes influence perceptions and performance in school and in life and are often cited as contributing to girls' problems in math and related fields such as technology" (p. 33). Carmen Keller's study discusses the effect of a teacher's stereotyping on students' stereotyping of mathematics as an area where males excel. When teachers assume that males earn better mathematics grades because of their interest in math; their self-confidence and the importance these teachers place on mathematics in the students' future careers, Keller's research concluded that students may also exhibit these stereotypes. Students seem to adopt their teachers' mathematics stereotyping (2001). Gavin and Reis (2003) offer strategies for parents and teachers to help girls. They recommend parents and professionals create a learning environment which:

- encourages risk-taking and creative thinking,
- offers support, and
- provides a challenging curriculum with opportunities for alternate assessments and a variety of learning styles to enhance their interests and learning in mathematics.

Educators are also advised to be mindful of the additional attention some tend to give to boys and instead provide female role models and mentors and enhance the strengths demonstrated by the girls through their instruction and support (Gavin & Reis, 2003). The basis for Gavin and Reis' strategies (2003) is the National Council of Teachers of Mathematics publication, Principles and Standards for School Mathematics (2000) which

offers activities and strategies with *all* kids in mind. The constructivist focus of the publication would allow students to discover and create their own knowledge while building confidence in math, hopefully for girls, and promote good teaching strategies and techniques.

Ethnicity. There is a considerable amount of research on ethnicity as a factor in student achievement in mathematics (Holman, Gonzalez & McNeil, 1993; O'Connor, 2001; Slocumb-Bradford, 2003; Smith, 2005; Stevens, Olivarez, Lan & Tallent-Runnels, 2004; Tucker, Porter, Reinke et al., 2005). Lisa O'Connor's (2001) results reveal significant differences in math and reading scores based on contextual factors, e.g., home environment, when she examined the factors which contribute to the gap in reading and math test scores between African American and White students. Her findings also report that while student birth weight status is the largest negative factor affecting the closing of the reading and math test score gap, the family's income level and the mother's literacy level have the greatest positive effect, reducing the reading and math score gap between African American and White students. Students of various groups who are not represented in advanced mathematics courses may be cheating themselves out of the future benefits and applications of the knowledge. Researching the self-efficacy and motivation of mathematics students may also hold answers for researchers trying to determine why minority students are not enrolled in advanced mathematics classes and/or why there is a gap in math achievement across ethnicity. Stevens, Olivarez, Lan and Tallent-Runnels (2004) define self-efficacy as a student's ability to internally find his/her own path to success. They base their research on the motivation, math performance and self-efficacy of 317 high school students, but only Hispanic and White student self-

reported data were analyzed. The findings imply that self-efficacy predicts the motivation and performance of Hispanic and White students in mathematics. The greater the self-efficacy, the higher the motivation level and as these researchers imply, the greater the possibility that the youngsters will engage in advanced math courses or careers. It is the task of parents and educators to create environments which will foster self-efficacy for students.

Tucker, Porter, Reinke et al. (2005) researched and reported on the effects of teacher self-efficacy on the academic (and behavioral) outcomes of students of various ethnic groups and cultures and offered methods to enhance teacher efficacy when working with these student groups. It was Bandura's (1977) theory of self-efficacy that explained the beliefs that teachers may have about their skills and abilities to create positive outcomes for their students in light of the student's home life and peer influence. Tucker, Porter, Reinke et al. studied the relationship between racial attitudes and perceived ability to work with diverse student groups by focusing on the effects of a teacher in-service program. Findings are that the teacher-training program *did* offer guidelines for teachers and administrators in efforts to increase teacher efficacy in working with culturally diverse students (Tucker, Porter, Reinke et al., 2005)

Smith (2005) studied the factors African American educators take into account when designing their expectations and perceptions of low SES African American urban students—race, culture, ethnicity and SES, and the influence the teacher's racial and/or cultural background has on the instructional practice. Smith concluded that teachers who share the racial and cultural background of their students are subject to similar concerns in a classroom with racial differences. Teachers who reflected on the education and out-

of-school experiences of their students experienced an increase in their effectiveness with at-risk students. Therefore, African American teachers who socially construct their perceptions of student achievement while maintaining high expectations for them are very important to the success of low socioeconomic African American students. Even non-African American educators who used culturally relevant pedagogy can be effective as well, according to research results (Smith, 2005). Smith's study helped these teachers confront their personal bias and how they may influence instruction.

Environment. An example of more recent research of factors associated with student achievement in mathematics and enrollment in advanced math courses in Canada, Norway and the United States is an exploratory study conducted by Ercikan, McCreith and Lapointe (2005). For American students, the parent's education level is the highest predictor of student achievement while confidence in mathematics is for Canadian and Norwegian students (Ercikan et al., 2005). The home and personal environment is correlated with math achievement for all groups of students. With respect to gender, American females' attitudes toward mathematics are a very strong predictor of academic success (Ercikan et al., 2005). The classroom performance of students depends on so much more than the homework submitted and the grades on tests and quizzes administered, but there is still a lot to be learned and areas yet to be adequately researched. Educators need to know how student attitudes toward math are developed and more about the nature of home and personal environmental factors, such as the socioeconomic status, or SES, of the family and its effect on student achievement.

Equally as important as the student's gender and race and many of the other factors is the socioeconomic status of the student's family according to the research. Consider the

research of Okpala, Okpala and Smith (2001) who investigated how SES, parental involvement and instructional supplies expenditures impacted the mathematics achievement of fourth graders in several poor counties in North Carolina. The percentage of students who participate in free and reduced lunch programs helped to determine the family's SES. Parental involvement was measured in parental volunteer hours per 100 students. The federal, state and local per pupil expenditure dollars for the various schools was used to reflect "school inputs", or examples of school resources which illustrate the quality and quantity of resources in a school and which may impact student achievement and success (Greenwald et al, 1996; Okpala, Okpala and Smith, 2001). Mathematics achievement was measured using North Carolina's Mathematics End-of-Grade (EOG) test since mathematics is one of the required areas used in measuring academic achievement. Forty-two elementary schools with a total fourth-grade population of 4256 students was the sample in the quantitative study; schools were classified into three categories—high-income, middle-income and low-income schools, based on the per pupil expenditures. The percentage of students in free and reduced lunch programs was correlated negatively with the mathematics scores. Okpala, Okpala and Smith's (2001) results further supports research which states that a student's SES and his/her academic achievement *are* correlated while there was a lack of significance in the correlation between instructional supply expenditures, parental volunteer hours and free/reduced lunch (2001).

Eileen Anderson and Timothy Keith's (2001) research focused on at-risk high school students and the factors that help them become successful in school. According to them, at-risk students many times are demographically similar to groups that have achieved

poorly in the past, such as low SES students. Research shows that these students are more likely to graduate without basic academic skills, making them at-risk of becoming educationally disadvantaged as adults. Their research concluded that motivation had a strong total effect on the achievement of the non-Asian minority students from low SES households (Anderson & Keith, 2001).

The purpose of Charles Willie's 2001 study, *Contextual Effects of Socioeconomic Status on Student Achievement Test Scores by Race*, was to determine the effect of the socioeconomic context of a South Carolina school district on the educational achievement of African American and White students. Elementary and middle schools in the district were classified by SES as poverty-concentrated; socioeconomically mixed and affluent based on the student eligibility for the free or reduced-cost lunch program. While only 15% of the sixty elementary and middle schools were affluent, the majority fall into the other two categories—45% poverty-concentrated and 40% socioeconomically mixed. Willie (2001) concluded that in general, poverty-concentrated schools were predominately African American, but few African American students attended the affluent schools. The majority of all students attend the socioeconomically mixed schools. The Charleston County School District is approximately 63% African American and 37% White. Student achievement was measured by student performance on the Metropolitan Achievement Test (MAT). The MAT measures student achievement in mathematics, reading, language, science and social studies and reports the proportion of students at each school site scoring above or below the national MAT norm by ethnic group (Willie, 2001). Willie's research concluded that the average achievement score on the MAT increased as the family SES increased. In other words, the achievement scores

of African American and White students may be influenced or otherwise affected by the context within which learning occurs, in this case, the socioeconomic characteristics of the elementary or middle school these students attend (Willie, 2001). The research of Kohr, Masters, Coldiron, Blust and Skiffington (2001) yielded similar results based instead on 5th, 8th and 11th grade mathematics achievement in over 200 school districts derived from the Pennsylvania Educational Quality Assessment Program. Four years of data, from 1981 to 1984 were gathered including the background information for 35,000 to 50,000 students per year; the data included parental occupation; parental education and the amount of reading material in the home. Each variable was given a score; these scores were converted into z-scores (standard scores) and totaled for analysis. Kohr, Masters, Coldiron, Blust and Skiffington (2001) also determined a *school* SES which was defined in terms of the percentage of low income families in the area served by the school. If, for example, 10% or less of the students attending a particular school were classified as low income families, the school was characterized as a high SES school. Consequently, if 20% or more of the students in grade 11 (or 30% or more for grades 5 and 8) are from low income families, the school was classified as a low SES school (Kohr, Masters, Coldiron, Blust & Skiffington, 1989). At the conclusion of their study, Kohr et al's (2001) findings appear to support past research which concluded that socioeconomic differences are correlated to student achievement, but their research is probably most significant for the methodology used to analyze the differences between the ethnic groups which were not confounded by their SES level.

Putting it all together. One of the most relevant empirical studies to this proposed study relating to gender is the research of Robert Helwig, Lisbeth Anderson and Gerald

Tindal on the influence of gender on teachers' perceptions of elementary student achievement in math (Helwig, Anderson & Tindal, 2001). Their study reports on research by Hyde, Fennema & Lamon (1990) and others (e.g., Geary, 1996) which concludes boys tend to outperform girls in numerous measures of mathematical achievement. Helwig et al. report the findings of research conducted by Bennett, Gottesman, Rock & Cerullo (1993) on the accuracy of teacher predictions of student achievement. Rong's (1996) research on the propensity of boys to exhibit more undesirable classroom behaviors, and the results of an earlier study by Williams (1976), also described in the work of Helwig et al., claim that these negative male behaviors could influence the cognitive evaluations teachers have of their students.

These studies form the basis for the study designed by Helwig et al. Fifteen third grade and fourteen fifth grade teachers and their students from elementary schools in six public school districts comprised the representative sample (N=512). The teachers were asked to rate the mathematical skill level, classroom behavior and effort of the students; they were not told student test results and the study's focus on gender at that point in the study. Reading and math achievement tests were administered to the students. Statistical measures to determine correlation and regression analyses were made between teacher perceptions of the academic performance and student gender. Helwig et al. were amazed to discover that the data show teachers disregard student gender and factors pertaining to behavior and instead base their perceptions on student performance (cognitive domains). These results validated the conclusions of related research (Jussim & Eccles, 1992; Wilson & Wright, 1993). The data show that student effort is a key factor in the perceptions of teachers relating to student mathematics performance. Helwig et al.

(2001) identified several limitations which provide an opportunity for further research in the area. First of all, the researchers focused on only one aspect of student behavior which relates to gender when several could legitimately come into play. This potential gender bias threatened the generalizability of the research. Secondly, there was no accounting for the gender of the teacher realizing that male and female teachers may differ in their perceptions of student behavior as also concluded in research by Rong (1996) and reported in Helwig et al.'s (2001) study. Finally, no student demographic data including variables such as socioeconomic status or parental involvement were incorporated although studies have determined that these factors may be linked to student achievement (Hickman, 1995; Sui-Chu & Willms, 1996).

Conclusion

This researcher's review of relevant literature provided background on the relevant issues and factors which affect the research questions related to grades, standardized achievement tests, teacher perceptions of grades and the influence of gender and ethnicity and the socioeconomic status of families on student achievement. Prior research implied that gender-related expectations for students do exist in schools, but more research must be done to offer more insight into the causes, limitations and remedies. The limitations of Helwig et al.'s study (2001) provided this researcher the opportunity to enhance the research in this area. The relevant literature on the influence of ethnicity on student achievement and grades is vast, but by combining this variable with gender differences of students *and* SES, there was an area in need of further research. Therefore, in this study, the researcher looked at Algebra II End-of-Course test scores and teacher assigned mathematics grades in six high schools in an urban school district in central North

Carolina over three semesters. In today's schools, a focus on mathematics curriculum and instruction is only part of the picture, given the multifaceted world of testing, grading and factors affecting student performance. Educational equity is also crucial to provide a learning environment conducive to learning and achievement for all students. Hopefully, the findings of this study provided insight into teacher perceptions based on the gender, ethnic group and socioeconomic status of his or her students.

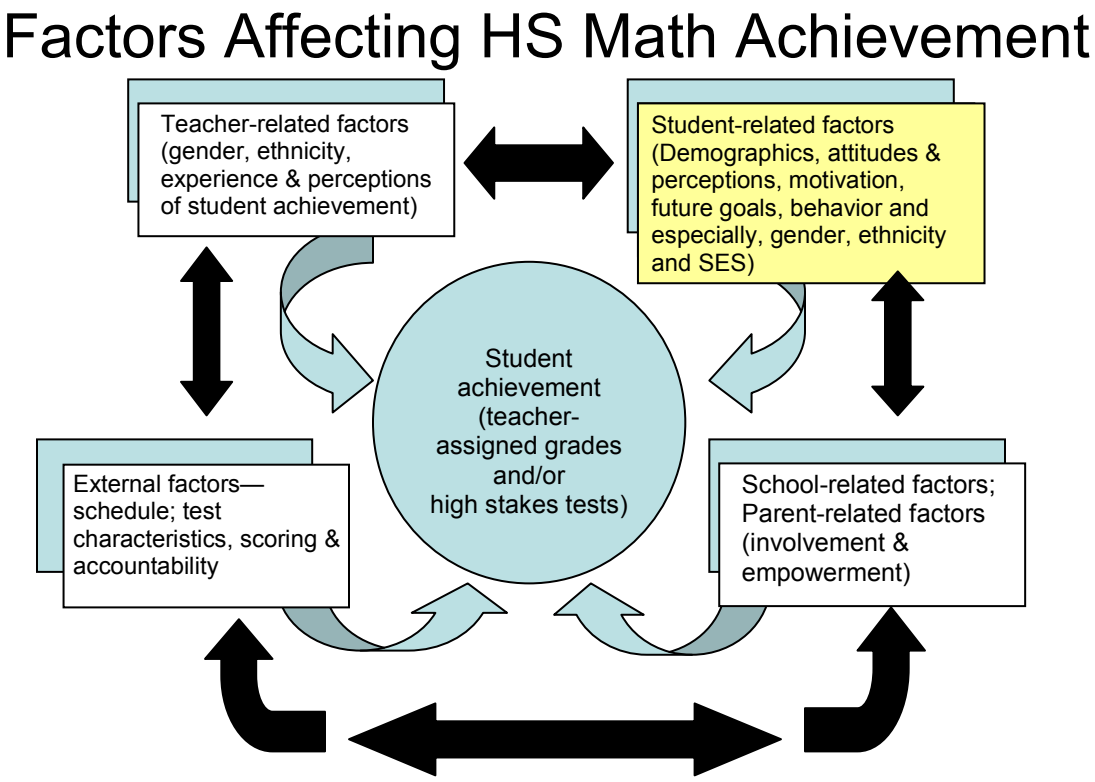
Conceptual Framework

A conceptual framework based on the relevant literature was developed to begin the study on teacher perceptions of student achievement in secondary mathematics. The graphical representation of this framework is shown in Figure 1. Possible relationships between the variables relevant to this study are represented. The major elements of the framework are: student-related factors, e.g., the gender, ethnic group and socioeconomic status of the student, motivation, behavior, future goals and teacher expectations (Parsley & Corcoran, 2003); teacher-related factors, such as teacher gender, race and years of experience teaching mathematics as well as the teacher's perceptions about student achievement; parent-related factors, e.g., socioeconomic status (Anderson & Keith, 2001; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Okpala, Okpala & Smith, 2001; Willie, 2001), involvement and empowerment relating to their student's school, and external factors affecting high stakes testing. The related literature shows the possible affect of external variables such as scoring, test characteristics and accountability or even the school schedule on student achievement (Deuel, 1999; Gavin & Reis, 2003). The outcome for the conceptual model is student achievement reflected in the grades assigned by teachers and the scores received on the high stakes tests, e.g., the End-of-Course

(EOC) test in math. It is represented by the large center circle in the diagram. The relationship of each of these four variables to student achievement is depicted as directly relating to student achievement, but each of these factors shares an additional relationship. The interaction between these variables may also have an impact on the grades students receive for the class and on identified high stakes tests (Deuel, 1999; Thompson, Warren & Carter, 2004).

Research does show that grades are based on a variety of factors (Blount, 1997; Senk, Beckmann & Thompson, 1997). The involvement and empowerment of parents as well as their socioeconomic status and other demographic characteristics may affect not only

Figure 1: Graphic Representation of the Conceptual Framework



Note. Based on a framework presented in: Ekstrom, R.B. (1994). Gender differences in high school grades: An exploratory study. *College Board Report No. 94-3. College Board Publications*, 2-38.

students, but also teacher perceptions and student achievement in general (Griffith, 1996; Reynolds & Reynolds, 1992; Weissberg, Kasprow, 1992). Relating to student demographics (ethnicity, gender and SES), Ekstrom (1994), Gavin and Reis (2003) and Ercikan, McCreith and Lapointe (2005) researched student gender and math achievement, concluding that girls tend to receive higher grades than boys in math, but the boys tend to score slightly better than the girls on standardized tests. Numerous studies have analyzed the affect of ethnicity on student achievement (Ercikan, McCreith & Lapointe, 2005; Stevens, Olivarez, Lan & Tallent-Runnels, 2003). Lisa O'Connor's study (2001) examined the gap in test scores between African American and White students. However, there is a need for more research on the affect of teacher gender, realizing that male and female teachers may differ in their perceptions of student achievement based on student behavior and performance (Gavin & Reis, 2003; Helwig, Anderson & Tindal, 2001; Rong, 1996). This study expands existing research as it examines student gender, ethnicity and socioeconomic status as well as teacher predictions of student achievement in mathematics classrooms.

This conceptual framework was adapted from a conceptual model developed by Ruth Ekstrom and included in her 1994 study about gender differences in high school grades although the research of Lisa O'Connor (2001) also conceptualized the factors and interrelationships in a similar manner. This researcher developed the graphical representation, based on the models used by Ekstrom and O'Connor since the purpose of this study was similar—the researcher investigated teacher predictions of student achievement based on a variety of factors. Although a number of factors have been

identified in the literature, this research study focused primarily on student ethnicity, gender and the socioeconomic status of each of the six high schools attended by students in the study.

CHAPTER III

Research Methodology

Research Design

The purpose of this study was to investigate the perception of student achievement based on student gender, ethnicity and socioeconomic status in high school math in an urban school district in North Carolina. The review of literature explored variables which may affect testing and grades. They are categorized as external variables; parent-related variables; teacher-related variables and school-related variables. Student-related variables, based on gender, ethnicity and the family's SES and teacher predictions of student achievement could be influential factors and were the focus of this research. While the research attempts to explain the influence of student gender, ethnicity and socioeconomic status of the family in student achievement (Ekstrom, 1994; Gavin & Reis, 2003; Holman, Gonzalez & McNeil, 1993; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; O'Connor, 2001; Okpala, Okpala & Smith, 2001; Willie, 2001), there is a gap in the research which attempts to explore the relationship of these variables and teacher predicted grades and actual student performance. The present study assessed the influence of income, gender and ethnicity in teacher predictions of school performance.

Conceptual Framework

Many factors affect student achievement (Blount, 1997; Senk, Beckmann & Thompson, 1997). Relevant research shows that parent-related factors and student demographic factors as well as student attitudes and perceptions initiate the

interrelationships among other variables (e.g., future goals; student behavior and performance) (Gavin & Reis, 2003; Griffith, 1996; Helwig, Anderson & Tindal, 2001). The student's gender, ethnic group and the student's home environment or SES also impacts his or her math performance and achievement (Dusek, 1985; Holman, 1995; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Okpala, Okpala & Smith, 2001; Rong, 1996; Willie, 2001). Some external factors such as accountability, scoring, high stakes test characteristics and school schedules and the *school* resources also influence the assessment outcomes (Anderson & Keith, 2001; Deuel, 1999; Gavin & Reis, 2003). As further noted in the review of the literature presented in Chapter II, the interaction between all of these identified variables may also have an impact on the grades students receive in class and on high stakes tests like the End-of-Course, or EOC test (Deuel, 1999; Okpala, Okpala & Smith, 2001; Thompson, Warren & Carter, 2004; Willie, 2001). This research includes teacher predictions of student achievement to determine the implications for student math achievement.

Research Questions

The study is guided by the question, what are the perceptions of secondary math teachers of student achievement? The following questions guided the process of inquiry:

1. What are Algebra II math teacher predictions of student grades?
2. Does the gender, race and/or socioeconomic status of the students influence teachers' perceptions of student achievement?

Null Hypotheses

This investigation has the following null hypotheses:

1. Algebra II mathematics teachers do not make accurate predictions of student grades.

2. Gender, race and/or socioeconomic status of the students do not influence teachers' perceptions of student achievement.

Rationale

Federal, state and local education agencies issue mandates and policies which guide instruction and recommend accountability for schools. Some legislators place a great deal of emphasis on test scores and believe that state and national assessments are linked to strong standards which are the foundation for high stakes tests (Wright, 1988). Teachers and schools must prove their effectiveness (Popham, 1999) or have their students, teachers and parents face the consequences (Jones, Jones, Hardin, Chapman, Yarbrough & Davis, 1999). Student achievement in schools is a multiple assessment approach. Teachers use projects, portfolios, quizzes, homework and other activities to assess student performance. As Casbarro (2005) reported, the teacher's perception of grades and student achievement is a key factor in establishing student achievement. Research which analyzes student achievement and those factors which may affect it are therefore very important to helping schools make decisions and help students learn and succeed. Research indicates that teacher perception impacts student performance in school (Casbarro, 2005; Sparks & Ganschow, 1996; Teisl, Mazzocco & Myers, 2001; Tournaki, 2003). In addition, there is research which supports the belief that there are differences in performance across ethnicity, gender and socioeconomic status (Dusek, 1975; Ekstrom, 1994; Helwig, 2001; Holman, Gonzalez & McNeil, 1993; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Rong 1996). This research contributes to the existing research.

Role of the Researcher

In this study, the researcher was the primary and sole investigator. The researcher successfully completed the *CITI Course in the Protection of Human Research Subjects* online certification in March 2005 to be mindful of acceptable treatment of study participants. There was no direct contact made with students or teachers represented in the sample for this study. Verification of course completion is provided in the Appendix. The University's Institutional Review Board (IRB) approved the study in February of 2006 and successfully renewed the certification in February of 2007. The researcher was solely responsible for collecting, analyzing and maintaining a secure environment for all research data and other information throughout the study. At the conclusion of the study, those interested in the results of the study will be provided a copy of the results.

Site Selection

The research evolved from the researcher's graduate research internship experience in a local urban school district in 2004-05. The Office of Student Accountability and the then Executive Director of High Schools in the proposed district asked this researcher to compare math teachers' anticipated student performance scores with the students' actual scores (teacher-assigned scores). A data set of EOC scores and student grades presently exists in the school district's database. The relevant data set could be collected to begin the mathematical analysis, minus student names and other identifiable information. The internship experience was expanded into this dissertation study for the researcher.

Correlation to Educational Research in Mathematics

This research analyzed student assessment scores and teacher-assigned grades to investigate differences across student gender and ethnicity. Several related research

studies also incorporated this method of inquiry (Ekstrom, 1994; Ercikan, McCreith & Lapointe, 2005; Gibson, 1997; Hanich & Jordan, 2004; Helwig, Anderson & Tindal, 2001). School districts make many decisions based on data that are sometimes gathered prior to determining the question to be queried as is the situation in this research study. North Carolina is one of several states that use a statewide assessment to measure achievement of its public school students. The assessments are administered at least once per academic year to students in grades three through twelve. The End-of-Grade, or EOG, test is for elementary school students while the End-of-Course, or EOC, test is administered to high school students (and some middle school students) (North Carolina Department of Public Instruction, 2005b; Okpala, Okpala and Smith, 2001). As part of its focus on high standards, accountability and student achievement, the North Carolina Department of Public Instruction requires school districts to maintain a database of scores, including the EOG and EOC scores (North Carolina Department of Public Instruction, 2005b). The Algebra II End-of-Course test scores for the sample group provided quantitative data for the study. These high-stakes tests are administered to students in North Carolina secondary schools each year and are maintained in a master database in the school district's department of testing and accountability. As part of the EOC test administration instructions, teachers must predict and record the grade the students will earn in the course. Ekstrom's (1994) research on gender differences in high school grades used a mixed methods approach to gather data for the study; student transcript files provided high stakes testing scores as well as teacher-assigned grades that were analyzed and contrasted. In addition, teacher supplemental comment data were gathered from the Teacher Comment files—compilations of teacher responses to survey-

type questions. Barnett, Sink and Hixon (1993) statistically analyzed and correlated student achievement scores and teachers' ratings of student competence to research perceptions of scholastic competence and its relation to middle school student achievement. Yarbrough (1999) studied teacher perceptions of North Carolina's ABCs of Public Education program and its relation to classroom practice. Her methodology incorporated a teacher survey which was mailed to sixty-one schools with approximately twelve random telephone interviews that provided an opportunity for further exploration. McCoy's (2005) study on the effect of demographic and personal variables on student achievement in eighth grade Algebra and Geometry (2005) supports this researcher's inquiry methodology as well. She administered a student questionnaire to gather demographic data she analyzed together with the Fennema-Sherman Mathematics Scales (which measure attitude toward mathematics) and North Carolina End-of-Course Algebra I scores (2005). She analyzed these scores to investigate differences across student gender, ethnicity and socioeconomic status. No teacher survey was incorporated in this research; the demographic information analyzed was available from the school system's master database of student data. In addition, copies of the district's annual data books of demographic and statistical data were used as a source of additional information.

Participants

The sample analyzed in this study totals 4158 students in grades 9 through 12. A total of 1396 students took the Algebra II EOC test during the spring 2004 test administration while one high school site tested 224 students during the fall 2004 semester. This is compared to a total of 1652 Algebra II students for spring 2005 and 915 during the fall semester of 2005. The Barton School district tested a total of 4187

Algebra II students during the four test administrations, however, twenty-nine of those tested were not students of the six Barton high schools, so they were deleted from the study. The six middle school Algebra II teachers of the 29 middle school students were also removed from analysis.

The sample is comprised of more female Algebra II students overall--2241 (54%). There are 1917 young men in the sample (46%). The ethnic breakdown of Algebra II students for each high school was also analyzed and is presented in Table 1. A majority of 2041 students are African American (49%), followed by White students (40%). Only 184 students (4%) in the sample are Hispanic; 126 students (3%) in the sample are Multiracial and 120 (3%) are Asian. Six of the 4158 students (less than 1%) in the sample are identified as Native American. The student sample population reflected by high school attended is also presented in Table 1.

Table 1

Descriptive Statistics for the Barton District Algebra II High School Student Sample

Variable	*M*	*SD*	*n*	%
Gender				
Female			2241	53.9
Male			1917	46.1
Ethnicity				
African American			2041	49
Native American			6	1
Asian			120	3
Hispanic			184	4

White	1681	40
Multiracial	126	3
Test Administration		
Spring 2004	1396	33
Spring 2005	1652	39
Fall 2005	915	22
Fall 2004 (Salem HS only)	224	5
Algebra II Student Population by Barton District		
Adams	350	8
Baker	628	15
Davis	1019	24
Langley	804	19
Roosevelt	968	23
Salem	389	9

Note. Due to rounding, the percentages do not total 100. A total of 29 Algebra II students were excluded from the study since they were not attending one of the district's high schools. They are not reflected in the study, so the total number of students in the sample is 4158.

The schools are: Adams High School; Baker High School; Davis High School; Langley High School; Roosevelt High School and Salem High School. The student sample group is made up of male and female students of various ethnicities, math abilities, grade levels and socioeconomic status. The grades 9-12 student population was 1900 students or less at each high school site during the analysis period; the sample includes a total of 4158 Algebra II students who were administered the spring 2004, fall 2004, spring 2005 and

fall 2005 Algebra II End-of-Course tests. Native American, Asian, African American, Hispanic, Multiracial and White students are represented in the student sample. Demographic data and testing results for students enrolled in Algebra II during the fall 2005 semester were not available until late in February 2006, also *after* IRB approval and entry into the district was possible. Since all high schools in the Barton School District are on block schedules beginning in the Fall 2005 semester, the Algebra II course grade data for the last Algebra II test administration included in this study were not available for the sample group until almost February 2006—at the end of the semester. Moreover, all EOC students are given a report card of "INC" on their end of semester report cards until the grades are calculated and forwarded to the district by the NC State Department of Public Instruction.

Table 2 provides a detailed breakdown of the Barton School District population by ethnicity, gender and percentage of economically disadvantaged students from each of the six Barton District high schools between May of 2004 and December of 2005.

Looking at the school sites, Davis High School and Roosevelt High School have similar student ethnic composition. Davis High School reported a total minority population of 1017 students in 2003-04, increasing to 1025 and 1059 in 2004-05 and 2005-06 respectively. Roosevelt reported a total minority population of 969, 1009 and 1086 for the same academic years respectively. Their African American and White populations were similar, and they reported a very high percentage of low SES students passing the EOC with level 3 or level 4 (82.4%; 82.4% and 54.7%). Baker reported the largest minority population for each of the three academic years (1389, 1517 and 1481), as well as the largest percentage of economically disadvantaged students (39.6%, 48.4% and

45.4%). Salem also has a large minority population and the second highest percentage of students receiving free and reduced lunch, a large percentage of whom earned level 3 and level 4 on the Algebra II EOC. The average Salem student is an African American female student who is eligible for free and reduced lunch. Adams High School had fewer African American, Native American, Asian and Hispanic students for each academic year studied (716, 753 and 733 respectively) than the other high schools. However, it is interesting to note their 04-05 reported data indicate only 9.1% of the low SES population received level 3 or level 4. The following year in 05-06, there was tremendous gain with 68% of their low SES population receiving level 3 or level 4, but 84.3% of the low SES population received an EOC score below level 3. Langley High School had large African American and White populations during the period analyzed for this study. This school also reported the third highest percentage of economically disadvantaged students in their school population.

Teachers

A total of 60 teachers instructed the 4158 Algebra II high school students. This study analyzed the teacher's assessment of student performance, but did not include teacher characteristics. Table 3 reflects the number of students taught by each of the teachers.

Table 2.

Ethnicity, Gender and Socioeconomic Status by Barton School and Academic Year

		Enrollmt	Minority Pop	Amer Indian Males	Amer Indian Females	Asian Males	Asian Females	Hisp Males	Hisp Females	African Amer Males	African Amer Females	White Males	White Females	Multiracial Males	Multiracial Females	% Econ Disadv	% Econ Disadv & L3 or L4	% Econ Disadv & NOT L3 or L4
Adams	03-04	1401	716	1	2	6	9	25	18	269	341	303	382	20	25	24.17	14.3	67.7
	04-05	1412	753	3	1	6	11	25	25	275	348	282	377	26	33	20.90	9.1	75.9
	05-06	1370	733	2	3	9	9	25	38	259	333	287	350	20	35	22.55	68.0	84.3
Baker	03-04	1460	1389	1	1	8	3	29	24	627	661	36	35	13	22	39.61	43.3	43.8
	04-05	1566	1517	1	2	8	6	32	27	677	731	33	16	12	21	48.38	44.7	40.6
	05-06	1517	1481	0	2	5	2	40	37	642	718	22	14	13	22	45.36	32.9	50.5
Davis	03-04	1846	1017	4	4	51	52	67	60	354	361	431	398	33	31	16.98	.	.
	04-05	1799	1025	2	3	45	44	92	67	356	349	395	379	33	34	18.82	64.3	73.0
	05-06	1829	1059	0	4	42	50	114	74	358	349	408	362	31	37	17.92	45.1	68.2
Langley	03-04	1602	930	2	2	15	4	39	29	388	408	335	337	16	27	26.38	49.1	68.5
	04-05	1604	961	2	0	13	7	46	31	416	400	326	317	19	27	26.49	53.8	70.6
	05-06	1633	969	0	0	13	13	51	33	393	428	331	333	18	20	27.12	41.0	69.7
Roosevelt	03-04	1750	969	3	2	29	12	96	69	371	344	412	369	20	23	21.49	82.4	75.5
	04-05	1820	1009	5	1	23	14	102	82	396	343	438	373	21	22	23.89	82.4	74.9
	05-06	1935	1086	6	3	25	15	100	106	422	359	470	379	28	22	24.44	54.7	79.4
Salem	03-04	1471	1178	0	2	11	3	64	50	468	556	142	151	13	11	34.77	60.9	58.7
	04-05	1510	1272	0	2	7	6	74	60	496	601	123	115	13	13	34.22	64.3	59.5
	05-06	1574	1361	1	3	3	4	83	70	562	614	116	97	11	10	31.88	50.0	61.8

Table 3.

Analysis of Number of Students Taught by Each Teacher

Teacher	*n*	*%*
Teacher 1	118	2.8
Teacher 3	104	2.5
Teacher 4	2	0
Teacher 5	50	1.2
Teacher 6	80	1.9
Teacher 7	85	2.0
Teacher 8	120	2.9
Teacher 9	68	1.6
Teacher 10	102	2.5
Teacher 11	87	2.1
Teacher 12	87	2.1
Teacher 13	69	1.7
Teacher 14	175	4.2
Teacher 15	43	1.0
Teacher 16	12	.3
Teacher 17	108	2.6
Teacher 18	19	.5
Teacher 19	21	.5
Teacher 20	22	.5
Teacher 21	295	7.1
Teacher 22	62	1.5
Teacher 23	3	.1
Teacher 24	186	4.5
Teacher 25	4	.1
Teacher 26	132	3.2
Teacher 27	107	2.6
Teacher 28	67	1.6
Teacher 29	55	1.3
Teacher 30	236	5.7
Teacher 31	101	2.4
Teacher 32	7	.2
Teacher 35	48	1.2
Teacher 36	40	1.0
Teacher 37	99	2.4
Teacher 38	94	2.3
Teacher 39	1	.0
Teacher 40	43	1.0
Teacher 41	57	1.4
Teacher 42	80	1.9
Teacher 43	139	3.3

Teacher 44	11	.3
Teacher 45	13	.3
Teacher 46	32	.8
Teacher 47	51	1.2
Teacher 48	111	2.7
Teacher 50	25	2.6
Teacher 51	67	1.6
Teacher 52	48	1.2
Teacher 53	1	.0
Teacher 54	48	1.2
Teacher 57	59	1.4
Teacher 58	49	1.2
Teacher 59	26	.6
Teacher 60	193	4.6
Teacher 61	84	2.0
Teacher 62	26	.6
Teacher 63	13	.3
Teacher 64	53	1.3
Teacher 65	8	.2
Teacher 66	12	.3
Total	4158	

Note. Missing Teacher numbers account for middle school instructors of Algebra II.

End of Course Test Scores

End-of-Course test scores are reported on an achievement level ranging from 0 to 4 where 4 represents the highest possible level or score. These students consistently perform in a *superior* manner—beyond proficiency requirements in Algebra II and are deemed well prepared for a more advanced level of mathematics. Scores of 3 or higher represent proficiency on the material tested. Students performing at this level consistently demonstrate mastery of Algebra II topics and skills and are prepared for a more advanced level of mathematics. Scores of 2 and below demonstrate that the student has not mastered the tested objectives and is not proficient enough in Algebra II content and skills to be successful in a more advanced level of mathematics. A score of 1 indicates that the student does not have sufficient mastery of the knowledge and skills of

Algebra II to be successful in a more advanced math; those earning a 0 score frequently have demonstrated very little to no mastery of the Algebra II curriculum.

Measures

The North Carolina Department of Public Instruction offers achievement level ranges for the Algebra II End of Course test to help students, parents, teachers and administrators interpret test results (North Carolina Department of Public Instruction, 2006). A score of 69 or higher on this 120 minute test equates to a score of 4, or a Level IV on the Algebra II End of Course test. The score of 3 (Level III) equates to a score of 58-68. (See Table 4.) Students receiving a Level II or score of 2 are not considered proficient in Algebra II skills and topics with an achievement range of 46-57. Students earning a score of 1 or 0 have a score of 45 or less and have demonstrated little to no proficiency of the Algebra II curriculum (North Carolina Department of Public Instruction, 2006).

Table 4.

Algebra II End of Course Test Achievement Level Ranges

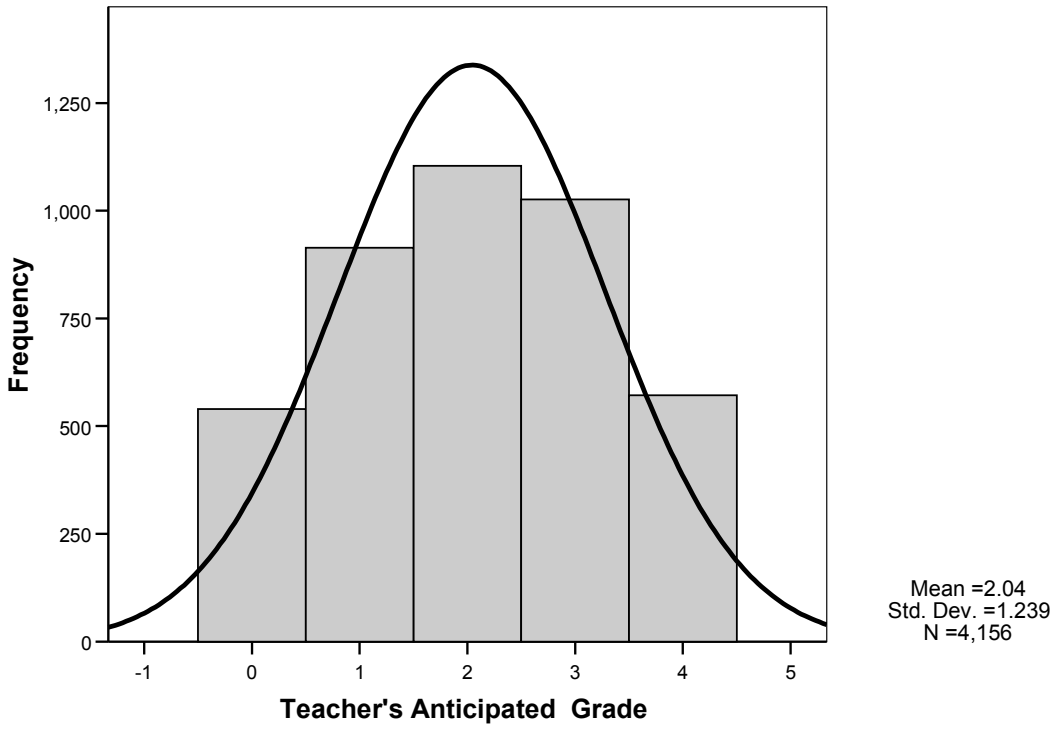
Score	0	1	2	3	4
	0	Less than or equal to 45	46-57	58-68	Greater than or equal to 69

Note. From North Carolina Department of Public Instruction, 2006.

A frequency analysis of the students' EOC test data reflect that fifty students (1.2%) in this study earned a score of "0"; one hundred fourteen students (2.7%) earned a score of "1". Almost 1200 students in the sample (n=1192) earned a score of "2", representing

28.7%. Thirty-eight percent (n=1518) scored a "3" and 29.3% received a score of "4". (See Table 5.)

Figure 2. Histogram Reflecting Algebra II Teacher Anticipated Course Grade



Teacher's Anticipated Grade

Each of the 60 Algebra II teachers predicted the grade their students would earn for the Algebra II class. This prediction is required as part of the EOC test instructions and is made as their students are administered the test. The teachers determine a score of 0 to 4 for each student which is based on their professional evaluation of the student's academic performance and mastery of the curriculum. The Figure 2 histogram graphically represents the anticipated grade the Algebra II End-of-Course teachers *predicted* their students would earn in the class. It is interesting to note that Figure 2 closely resembles a

normal curve, M=2.04; given the size of the sample, this is expected. Teachers predicted 540 students would earn a "0"—the lowest score and 572 the high score of "4". They predicted 914 of the sample would earn a score of "1"; 1026 a score of "3", but the majority of the students (n=1104) to take the Algebra II EOC would earn the score of "2" which indicates that the majority of these Algebra II students would not master the objectives taught by their teachers.

Table 5 shows the number of students in the sample who earned 0 to 4 across the six high schools. It compares the teachers' predicted score for the class with the Algebra II EOC score the students earned. Teachers predicted that 540 (13%) of the students would

Table 5.

Teachers' Anticipated Grade and Algebra II EOC Score Analysis

	Teacher's Anticipated Grade		EOC Score	
Score	*n*	%	*n*	%
0	540	13.0	50	1.2
1	914	22.0	114	2.7
2	1104	26.6	1192	28.7
3	1026	24.7	1581	38.0
4	572	13.8	1217	29.3
Total	4156	98.1	4154	99.9

Note. Due to rounding, the percentages do not total 100.

earn a course grade of 0 while only 50 (1%) of the students in the sample scored 0 on the EOC exam. These teachers expected a total of 914 (22%) to earn a score of 1 while 114 (3%) students scored a 1 on the exam. The data show that just over 1100 students

(*n=1104*), or 27% were predicted to earn a 2, a score that demonstrates lack of mastery of the mathematical concepts taught in Algebra II. Actual EOC score results show that of the 4154 scores reported 1194 were scores of 2 (29%). Teachers predicted that 1026 (25%) would demonstrate proficiency with a course grade of 3; a total of 1581 (38%) students actually scored 3. Five hundred seventy-two (14%) grades of 4 were anticipated. From the sample, 1217 (29%) received the highest possible score of "4" on the Algebra II EOC.

Algebra II Course Grade

The 4158 students in the sample earned course grades ranging from 0 to 99. Fifty students (1.2%) received a course grade of 0 while only two students received a 99. The mode grade is 61; a total of 181 students (4.4%) received this grade. Seventy-five percent of the sample received a grade of 70 or lower. Research shows that the course grade may be influenced by a number of factors, such as teacher-related factors; student attitudes and demographics; scoring and other test characteristics as well as the school's schedule and parent involvement and empowerment (Anderson & Keith, 2001; Blount, 1997; Deuel, 1999; Ekstrom, 1994; Gavin & Reis, 2003; Holman, 1995).

The Algebra II EOC grade extracted from the Barton database ranged from 0 to 99. The EOC test score and teacher's anticipated score are scale scores ranging from 0 to 4. To analyze the two scores and the predicted score, the Algebra II EOC grade was recoded using *SPSS*. The range levels are presented in Table 6. A score of "0" equates to a grade of "0" for the course. Students receiving a scale score of "1" did not demonstrate mastery of the Algebra II curriculum and received a failing grade for the course. Likewise, students earning a "2" for the course did not master the Algebra II skills and

objectives. A grade of 69 and below is a failing grade in North Carolina schools. A scale score of "3" indicates that the student passed the course with some difficulty, but did demonstrate mastery of some of the mathematical concepts, objectives and requirements for the course. Students receiving a scale score of "4" performed at the highest level. Table 6.

Algebra II End-of-Course Grade Ranges

Score	0	1	2	3	4
	0	1 – 20	21 - 69	70 - 84	85 – 100

Their performance demonstrates mastery of the course requirements and objectives and indicates that they are prepared for a higher level of math.

Frequency analyses were run using the recoded EOC grade data to check for errors. A histogram for the EOC grade (Figure 3) was created to compare it with histograms for the EOC score and teacher's predicted score. The majority of the students in the sample (46.8%) scored a "2", a failing grade. The histogram shows that 1024 students (24.6%) received an even lower scale score of "1". Fewer than 12% of the Barton Algebra II students scored a passing grade of "3" (n=456) and 16.3% (n=676) of the students earned a "4" for the course.

Table 7 shows the number of students in the sample who earned 0 to 4 in the Algebra II course and breakdown of the scale score as predicted by the Algebra II EOC teacher.

Figure 3. Histogram Reflecting Algebra II Course Grades

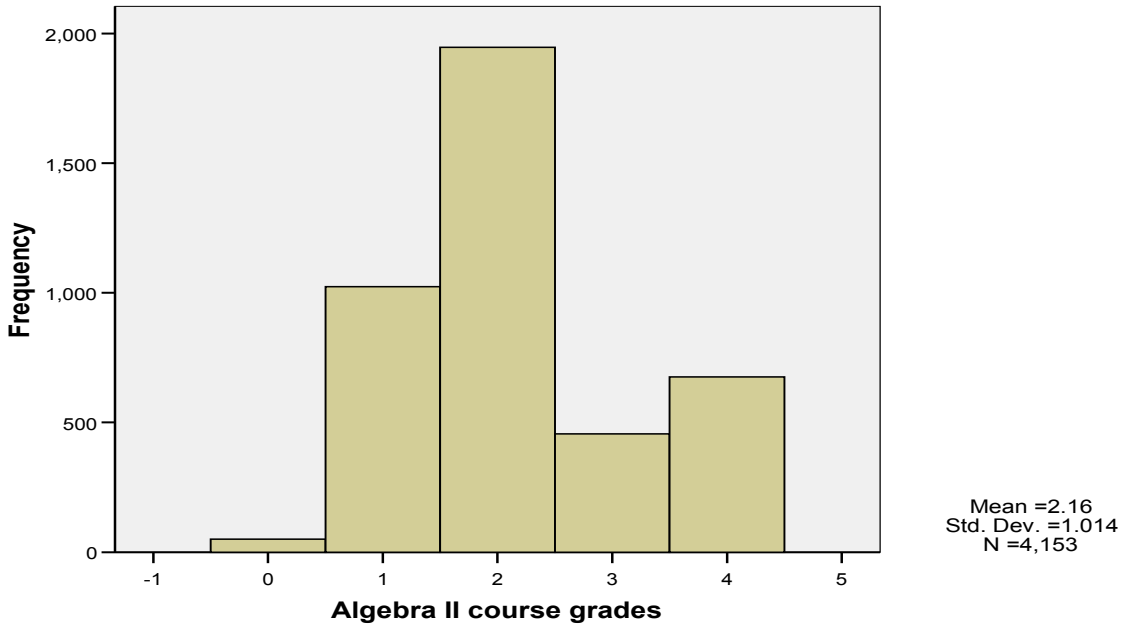


Table 7.

Teachers' Anticipated Grade and Algebra II EOC Grade Analysis

	Teacher's Anticipated Grade		EOC Course Grade	
Score	*n*	%	*n*	%
0	540	13.0	50	1.2
1	914	22.0	1024	24.7
2	1104	26.6	1947	46.8
3	1026	24.7	456	11.0
4	572	13.8	696	16.3
Total	4156	98.1	4153	99.9

Note. Due to rounding, the percentages do not total 100.

Fewer students earned a score of "0" (n=50) than predicted by the teachers (n=540) and more students earned the highest score of "4" (n=696) than anticipated (n=572). Teachers predicted that many more students would earn a passing grade of "3" (n=1026) than actually did (n=456) and fewer students would receive a "2" (n=1104) than did (n=1947).

The mean scores and standard deviation for the primary variables for each of the six Barton High Schools is presented in Table 8. Adams High has the fewest Algebra II students (n=350) and a higher mean on the EOC than the other high schools; Salem tested 389 Algebra II students. The mean score for the Algebra II course grade at Adams is M=2.33 which is lower than that of Davis (M=2.39) and Roosevelt (M=2.35), but higher than the course grade for Baker High (M=1.66). Langley, Davis and Roosevelt have a tested Algebra II population over 800 students for the research period, but their Algebra II teacher anticipated grade mean score is a 2 or below. The data show that none of the Barton High Schools had both a Level III or above EOC score *and* a mean score representing a passing Algebra II course grade.

Table 8.

Mean Score and Standard Deviation by Barton School

School/Variable	*n*	*M*	*SD*
Adams			
EOC Score	350	3.10	.92
Teacher's Anticipated Grade	350	2.07	1.30
Algebra II Course Grade	350	2.33	1.01
Langley			
EOC Score	802	2.84	.93
Teacher's Anticipated Grade	802	1.81	1.17

Algebra II Course Grade	802	2.07	.98
Davis			
EOC Score	1019	3.09	.87
Teacher's Anticipated Grade	1019	2.14	12.89
Algebra II Course Grade	1019	2.39	1.08
Roosevelt			
EOC Score	968	3.07	.82
Teacher's Anticipated Grade	968	2.29	11.89
Algebra II Course Grade	968	2.35	1.02
Salem			
EOC Score	388	2.81	.80
Teacher's Anticipated Grade	389	2.22	1.82
Algebra II Course Grade	388	1.98	.84
Baker			
EOC Score	627	2.45	.82
Teacher's Anticipated Grade	628	1.68	11.89
Algebra II Course Grade	627	1.66	.81

Data Collection

Entry was initiated once the researcher had successfully completed the IRB process. Access to the school sites was accomplished with a letter to the Director of Research & Accountability for the Barton School District to officially introduce the researcher and provide a general overview of the project. She also required verification of IRB certification and a five page summary of the research proposal. A copy of each of these documents is included in the Appendix. The researcher also offered to meet with the Director to share more specific information and personally explain the research plan and/or provide a copy of the complete research proposal. Once the materials were received by the school district's representative, this researcher was contacted and

informed that a recently passed education law now prohibits districts from releasing some student data previously permitted. In particular, free and reduced lunch information can no longer be provided for individual students in schools**.** The district representative described the 2002 federal guideline in two letters, *Joint U.S. Department of Education and Department of Agriculture Letter Providing Guidance on Implementation of the New Requirements of Title I by Schools that Operate School Lunch Programs,* which addresses a school system's responsibility to protect the privacy of students as they implement President Bush's No Child Left Behind Act (NCLB). Copies of the letters are provided in the Appendix. As a result of such guidelines, if the district approves the release of any data to this researcher, only certain types of information may be given. The researcher was not aware of this restriction relating to student free and reduced lunch status information at the time the study was designed. To compensate for this unexpected change in policy, the researcher was allowed to obtain the percentage of students eligible for free and reduced lunch *by school*, and information was reported for each of the sites in the Barton School District for the appropriate school years. This information is included in Table 2 which also shows the SES for students earning Levels I thru IV by school.

Data collection was not completed until July 2006 due to the intense testing schedule and workload of the district's testing office. The researcher was asked to code the teacher information in the presence of the department coordinator before the data could be retrieved. The district maintained a copy of the information transferred to the researcher's data key. The researcher's data are stored on a computer flash drive which is maintained in a secure environment by the researcher.

Following the request for the data, the researcher was given a "memo of understanding" by the district's testing and accountability director which listed the print resources available to access information such as gender and ethnic breakdown for each high school by year. Variables included in the collected data set are: grade in school, level, course grade, EOC score, teacher name (coded), school name (coded) and teacher predicted grade. Student names, social security or SIMS number and free/reduced lunch eligibility for each student were not included in the data set provided to this researcher. The percentage of students eligible for free and reduced lunch at each of the Barton system's six high schools—Adams, Baker, Davis, Langley, Roosevelt and Salem was available from the official website of the North Carolina State Department of Public Instruction. The researcher was able to verify several portions of the data using documents from a copy of the Barton school district *Administrator's Data Book* for the 2003-04 and 2004-05 academic years.

Data Analysis

SPSS 14.0 for Windows was used for analysis of the data for this research. Once the data were uploaded into *SPSS*, it was "cleaned". Two data assistants from the Barton School District were employed to enter the data. To ensure the accuracy of entry, this researcher randomly selected 10% or 418 entries which were rekeyed. Initially, descriptive statistics and frequencies were run to assess whether the variables were in acceptable ranges and to assess data entry errors. The Algebra II EOC course grade was recoded to a 0 to 4 scale. Correlations were used to assess the relationships between the primary variables. Independent samples t-test were computed to assess difference across gender. ANOVA and univariate analysis of variance were run and repeated measures

model was constructed to assess mean differences across gender and ethnicity and to analyze the perception gap which exists between the teachers' predicted score and the Algebra II End-of-Course grade. Bonferroni and Tukey post hoc tests were conducted to determine where these differences were.

CHAPTER IV

Results

This chapter describes the quantitative findings of this research study and focuses on examining the statistical relationships between Algebra II EOC grades, Algebra II student course grades and the teachers' prediction of student course grades. Student ethnicity, gender and socioeconomic status were examined to assess differences in teacher prediction and performance. Analysis of variance (ANOVA) and an independent samples t-test were computed to analyze the mean difference between the gender, ethnicity and school. The data were transferred into an *SPSS* file.

Differences Among Grades and Scores

The mean differences and standard deviations were assessed for the primary variables--Algebra II EOC scores, teacher anticipated grades and the Algebra course grades. From the sample of 4154, the mean score is 2.92 for the EOC with a standard deviation of .90. The 4156 teachers' anticipated scores represent a mean of 2.04 and a standard deviation of 1.24. The mean for the course grade is 2.16 with a standard deviation of 1.01. (See Table 9.) Table 8 reflected the mean scores and standard deviation for each primary

Table 9.

Mean Scores and Standard Deviation of Primary Variables

Variable	*n*	*M*	*SD*
EOC Score	4154	2.92	.90
Teacher's Anticipated Grade	4156	2.04	1.24
Algebra II Course Grade	4153	2.16	1.01

variable by Barton high school. Mean differences and standard deviation for the primary variables relating to gender are significant for females and males. (See Table 10.)

Table 10.

Mean Scores and Standard Deviation Relating to Gender

Variable	*n*	*M*	*SD*
EOC Score			
Female	2241	2.90	.87
Males	1916	2.93	.92
Teacher's Anticipated Grade			
Female	2240	2.18	1.21
Male	1916	1.88	1.25
Algebra II Course Grade			
Female	2240	2.14	.98
Male	1913	2.19	1.05

Research Question 1: What are Algebra II math teacher predictions of student grades?

Research question 1 seeks to determine whether the teacher predicted Algebra II course grades predict the grades these students actually received for the class. An independent samples t-test was used to assess significant differences in teacher predictions across gender. There was a significant difference in teacher anticipated score across gender. According to the results, the EOC score is significant for girls (t=7.99, p<.05) in that teachers' prediction for the females and the actual grade for the Algebra II

course were significant at the .05 level. There was no significant difference in gender for the Algebra II course grade (t=.58, $p<.05$) and EOC score ($t=1.21$, $p<.05$).

A one-way ANOVA test was conducted which indicates that there is a significant mean difference across the Algebra II End-of-Course grade and ethnicity, $F_{(5, 4148)} =51.16$, $p<.01$. The ANOVA F-statistic was used to test the null hypothesis that there is no linear relationship. There is a significant mean difference between African Americans and Asians and between African Americans and Whites. The number of Native Americans in the sample is very small ($n=6$); as a result, the difference relating to this group cannot be not determined to be significant. Data conclude that there appears to be a lower perception of teacher anticipated grades of African American students compared to Asians and White students. According to the results, teachers *do* perceive grades for Asian and White students higher. Ultimately, to determine whether the differences lie--between the ethnic groups or within the ethnic groups in relation to the dependent variables, the researcher conducted (Bonferroni and Tukey B) post hoc tests. The researcher recommends caution in interpreting the data on all minority groups other than African Americans (and Whites) since the percentage of minority students represented in the sample is very low.

There was a significant difference in Algebra II course grade and ethnicity, $F_{(5, 4148)} =51.16$, $p<.01$. (See Table 11, p. 68.) There was a significant difference between the teacher's predicted grade and ethnicity, $F_{(5, 4150)} = 27.17$, $p<.01$. (See Table 12, p. 68.) Significant mean differences were found between the Algebra II End-of-Course test score and ethnicity, $F_{(5, 4148)}=56.85$, $p<.01$. (See Table 13, p. 68.)

Table 11.

One-Way Analysis of Variance (ANOVA) of Algebra II Course Grade and Ethnicity

Variable	*df*	*MS*	*SS*	*F*
Algebra II Course Grade				
Between	5	7367.26	36836.31	51.16**
Within	4148	144.01	597360.43	

Note. *$p < .05$, **$p < .01$

Table 12.

One-Way Analysis of Variance (ANOVA) of Teacher's Anticipated Grade and Ethnicity

Variable	*df*	*MS*	*SS*	*F*
Teacher's Anticipated Grade				
Between	5	40.45	202.25	27.17**
Within	4150	1.49	6178.30	

Note. *$p < .05$, **$p < .01$

Table 13.

One-Way Analysis of Variance (ANOVA) of End of Course Test Score and Ethnicity

Variable	*df*	*MS*	*SS*	*F*
End of Course Test Score				
Between	5	42.13	210.66	56.85**
Within	4148	.71	3074.34	

Note. *$p < .05$, **$p < .01$

Correlation of Variables

Initial analysis of the relationships between the teachers' anticipated grade, the Algebra II course grade and the EOC score indicate moderate to high correlations between the variables, especially between the course grade and the Algebra II EOC score. Analysis of the research questions for this study began with analysis of the correlation between the primary variables. The *SPSS* analysis of the correlations between Algebra II student gender, ethnicity, grade in school, course grade, and teacher's anticipated course grade and the End-of-Course test scores indicate statistically significant correlations. Correlation was used to determine the relationship between two or more *different*

Table 14.

Correlation Matrix for Student Variables

	Course Grade	Tchr's Antic Grade	EOC Score
Course Grade	1.00		
Teacher's Anticipated Grade	.561**	1.00	
EOC Score	.914**	.542**	1.00

*$p<.05$, **$p<.01$

variables in the sample. Table 14 presents the result of the correlation analysis. The correlation was very strong with respect to Algebra II course grade and teacher's anticipated grade, $r=.56$, $p<.01$; Algebra II course grade and Algebra II EOC score, $r=.91$, $p<.01$; and teacher's anticipated grade and Algebra II EOC score, $r=.54$, $p<.01$.

There were significant relationships between the teacher's anticipated grade, the EOC score and the Algebra II course grade.

Research Question 2: Does the gender, race and/or socioeconomic status of the students influence teachers' perceptions of student achievement?

The research question assesses the effect of gender, ethnicity and/or socioeconomic status on teacher predictions of student achievement. An independent samples t-test would reflect mean differences relating to gender. To determine the perception gap in the teacher's perceptions of student achievement across gender and ethnic group, the teacher's anticipated course grade is subtracted from the Algebra II EOC course grade. ANOVA analyses determined significant mean differences between gender and the ethnic groups represented in the sample, and Bonferroni and Tukey post hoc analyses would show where these differences are. ANOVA analyses would determine significant mean differences between the other variables and Bonferroni and Tukey post hoc analyses would show where these differences are.

Gender

Independent samples t-tests were run to analyze the mean differences between gender. There is a significant mean difference for females and males with regard to teacher perception (t=7.99, p<.05).

Influence of Ethnicity

From a review of the data on ethnicity and teacher perceptions, there were differences among the mean scores for each ethnic group across teacher anticipated score. An ANOVA revealed significance between: Asians and African Americans; African Americans and Whites; Asians and Hispanics; Asians and Whites; Asians and Multiracial

students; Hispanics and Whites and Multiracial students and Whites**.** (See Table 12, p. 68.) Significant mean differences were found, $F_{(5, 4150)} = 27.17$, $p < .001$. However, this researcher recommends caution in interpreting this data on all minority ethnic groups except African Americans given the small numbers of these groups represented in the study sample. African Americans comprise 49% of the sample and Whites 40%. (See Table 1, p**.** 47); each other group represents 4% or less of the sample (N=4158).

Socioeconomic Status

Although the income of each student in the sample was not directly assessed, data on the number of students receiving free and reduced lunch in a Barton high school were an indication of the socioeconomic status of that school. Free lunch for the school became a predictor of socioeconomic status (Holman, 1996). Mean differences indicated that there were differences across schools regarding teacher predictions. An ANOVA indicated that there were significant mean differences between the schools. Post hoc tests using Bonferroni and Tukey indicated that significant differences were found between: Adams and Langley; Adams and Roosevelt; Adams and Baker; Langley and Davis; Langley and Roosevelt; Langley and Salem; Davis and Baker; Roosevelt and Baker; Salem and Baker. Significant mean differences were found, $F_{(5, 4155)} = 27.17$, $p < .001$.

Perception Gap

The Algebra II End-of-Course grade reflects the reality of what each student in the sample received for their effort and achievement in the Algebra II course. The teacher's anticipated grade reflects the teacher's prediction of what each Barton student *may* earn for the semester's work in the course. As the research shows, many factors may be incorporated in this score, such as types of assessment used; scoring; student motivation;

behavior and effort (Anderson & Keith, 2001; Blount, 1997; Ekstrom, 1994; Senk, Beckmann & Thompson, 1997). Table 15 analyzes the gap in perception—that is, the actual score the students earned in Algebra II and the grade their classroom teachers believed they would receive at the end of the semester (.12).

Table 15.

Perception Gap between Teacher's Anticipated Grade & Algebra II EOC Grade

Variable	*n*	*M*	*SD*
EOC Course Grade	4153	2.16	1.01
Teacher's Anticipated Grade	4156	2.04	1.24
Difference/Perception Gap		.12	

Table 10 (p. 66) displays mean score and standard deviation relating to gender for the primary variables. From this table, we can determine the perception gap relating to gender for the Algebra II course grade and the teacher's predicted course grade. The results are displayed in Table 16. The results show a lower perception gap between the predicted Algebra II course grade and the perceived grade for females (.04) than for males (.31) indicating that teachers were more accurate in predicting Algebra II course grades for females.

Table 16.

Perception Gap Across Gender for Teacher Anticipated Grade & Algebra II EOC Grade

Variable	*n*	*M*	*SD*
Females			
EOC Course Grade	2240	2.14	.98
Teacher's Anticipated Grade	2240	2.18	1.21

Difference/Perception Gap		.04	
Males			
EOC Course Grade	1913	2.19	1.05
Teacher's Anticipated Grade	1916	1.88	1.25
Difference/Perception Gap		.31	

A similar procedure was followed to determine the perception gap across ethnicity for the Barton school district students. This data are reflected in Table 17. The perception gap was calculated for each of the ethnic groups represented in the sample; however, only the reported result for Whites and African Americans is comparable given the low numbers of students from the other ethnic groups in the sample. All contrasts were significant though small for Native Americans (-.33), Multiracial students (.16),

Table 17.

Perception Gap Across Ethnicity for Teacher Anticipated Grade & Algebra II Grade

Variable	*n*	*M*	*SD*
Whites			
EOC Course Grade	1678	2.61	1.05
Teacher's Antic Grade	1679	2.36	1.22
Difference/Perception Gap		.25	
African Americans			
EOC Course Grade	2040	1.79	.81
Teacher's Antic Grade	2041	1.75	1.17
Difference/Perception Gap		.04	

Hispanics			
EOC Course Grade	184	1.78	.80
Teacher's Antic Grade	18 4	1.87	1.24
Difference/Perception Gap		-.09	
Asians			
EOC Course Grade	120	2.78	1.06
Teacher's Antic Grade	120	2.80	1.20
Difference/Perception Gap		-.02	
Multiracial			
EOC Course Grade	125	2.18	1.22
Teacher's Antic Grade	126	2.02	1.30
Difference/Perception Gap		.16	
Native Americans			
EOC Course Grade	6	2.67	1.03
Teacher's Antic Grade	6	3.00	.89
Difference/Perception Gap		-.33	

Asians (-.02) and Hispanics (-.09). The gap between reality and the teacher's perception of achievement was .04 for African Americans compared with .25 for White students, indicating that teachers more accurately predicted the Algebra II course grade for African American students than White students. A repeated measures model was constructed to calculate the marginal effect for gender and the marginal effect for ethnicity and the marginal effect for ethnicity by gender. Table 18 reflects the mean differences for White

males (.48), African American males (.20), White females (.03) and African American females (-.08). There is a significant effect along the margin for ethnicity *and* gender, but not the same for African Americans and Whites as evident in the mean differences.

Table 18.

Mean Differences for the Perception Gap Between African Americans and Whites

Group	*MD*
White males	.48
African American males	.20
White females	.03
African American females	-.08

The marginal effect for gender is t=-10.35, p=.000. The marginal effect for ethnicity, particularly African Americans and Whites is t=-5.53, p<.001. The ethnicity by gender marginal effect is t=2.34, p=.019. The gender effect and the ethnicity effect are both significant while the interaction between gender and ethnicity is very significant. These results are reflected in Table 19.

Table 19.

Marginal Effects for Gender, Ethnicity and Ethnicity by Gender

Variable	*t*
Gender	-10.35
Ethnicity	- 5.53
Ethnicity by Gender	2.34

Note. $p \leq .019$.

CHAPTER V

Discussion

The purpose of this research was to investigate the perception of student achievement based on student gender, ethnicity and socioeconomic status in high school math in an urban school district in North Carolina. This chapter reviews and discusses the major research findings in terms of possible explanations and convergence with other literature in the area. The guiding question for this study inquires about the perceptions of secondary mathematics teachers of student achievement. The research questions are: (1) What are Algebra II math teacher predictions of student grades? (2) Does gender, race and/or socioeconomic status of the students influence teachers' perceptions of student achievement? The null hypotheses for this research are: (1) Algebra II math teachers do not make accurate predictions of student grades; (2) Gender, race and/or socioeconomic status of the students do not influence teachers' perceptions of student achievement.

To answer the research questions, this researcher statistically analyzed course grades; the grade that the Algebra II teachers predict their students will earn for the course; Algebra II End-of-Course test score data; gender; ethnicity and socioeconomic status of the Algebra II students from six high schools for a focused number of semesters. The research design and data analysis used in this study were similar to that used by Holman, Gonzalez and McNeil (1993) who also researched teacher perceptions of student achievement, focusing on SES, ethnicity and gender as key variables in their study. They concluded that socioeconomic status was the variable most strongly correlated with

student performance on high stakes tests. They also concluded that minority youngsters are more likely to be from lower economic backgrounds (Holman, Gonzalez & McNeil, 1993) and that these minority students do not perform as well as students from higher SES backgrounds.

Research Question 1: What are Algebra II math teacher predictions of student grades?

The strong correlation which exists between the Algebra II course grade, Algebra II EOC score and the grade the teachers predicted their students would earn in the class has already been displayed and analyzed**.** The teacher's anticipated grade is related to the course grade. ANOVA analyses also determined that the teacher predicted score and course grade have a significant impact on the EOC score and that the teachers' anticipated grades *did* predict the actual course grade. Students in the sample actually performed better than predicted by their Algebra II mathematics teachers. Teachers predicted that more than half of the sample would receive a course grade below 3, indicating that these students are not proficient. Based on the actual results of the EOC test, approximately one third of the students did not demonstrate proficiency of Algebra II. The good news is that the majority of the students did show mastery of the Algebra II curriculum. Parents want student grades to be meaningful and accurately reflect what the student has learned and performed (Bursuck, Munk and Olson, 1999). The Algebra II End-of-Course test equals 25% of the student's final course grade in the Barton School district and throughout the state of North Carolina (North Carolina Department of Public Instruction, 2004). Perhaps these teachers were being conservative in their course grade predictions, but without surveying or otherwise gathering data from the teachers, this can not be ascertained. However, as summarized in the literature and graphically represented

in the conceptual framework for this study, many *other* factors may be incorporated in the course grade (Ekstrom, 1994). This research verifies that student-related variables, such as gender, ethnicity and the family's socioeconomic status as well as teacher predictions of student achievement could be influential factors in student achievement.

Research Question 2: Does the gender, race and/or socioeconomic status of the students influence teachers' perceptions of student achievement?

The student sample is 54% female and the majority of the high school students in the sample are African American or White (See Table 1, p. 47.). Reflecting on the ethnicity and socioeconomic data presented in Table 2 (p. 51), high schools with large minority populations such as Salem and Baker, in particular, have large percentages of economically disadvantaged students.

The Pearson correlation coefficient shows a very strong correlation between the Algebra II course grade and the teacher's anticipated grade. As presented in Table 14 (p. 69), gender, ethnicity and the teachers' anticipated grade are highly predictive of the Algebra II course grade.

Gender

Based on the results of the independent samples t-test presented in this study, teachers are perceived as favoring students by gender. Teachers in the current study *did* predict girls would perform better in the Algebra II course. This result supports the research of Holman, Gonzalez & McNeil (1993), Sparks and Ganschow (1996). However, mean score data show that females in the present study did not perform as well as males on the actual EOC test. Several other researchers (Ekstrom, 1994; Ercikan, McCreith & Lapointe, 2005; Helwig, Anderson & Tindal, 2001) reached a similar conclusion about

the performance of females. Still others (Holman, 1995; Rong, 1996) attribute teacher perceptions of student behavior and achievement to the gender and ethnicity of the students *and* the teachers.

Ethnicity

Significant mean differences were found between the ethnic groups. Generally, teachers had a higher perception of White student performance in Algebra II courses than several of the ethnic groups. Many of the teachers represented have a lower perception of African American students' performance in Algebra II than that of Asians; the same result was found between African American Algebra II students and White students. In addition, the data show that these teachers similarly did not perceive Multiracial or Hispanic students as doing as well as Asian students in Algebra II. Teachers more accurately perceived grades for Asians and Whites. These findings are consistent with the research of Homan (1995) and O'Connor (2001) who concluded that African American students tended to score lower on standardized tests than White students and Asian students. Hispanic students also did not score as high as Asian and White students. The representation of Native American students in the sample is so low that no significant difference was detectable (n=6). However, the results relating to Asians (3%), Hispanics (4%), Multiracial students (3%) and Native Americans should be interpreted with caution given the low numbers of each of these groups in the study sample. Data relating to African Americans (49%) and Whites (40%) are more reliable given their representation in the sample.

Socioeconomic Status

The data reflect significant mean differences regarding teacher predictions among the six Barton high schools relating to socioeconomic status. Eligibility for free and reduced lunch was used as an indicator of socioeconomic status as it is in relevant research (Holman, Gonzalez & McNeil, 1993; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Rong, 1995). Since free and reduced lunch information was not available for each of the Algebra II students in the sample, the reported free and reduced lunch information for the school was substituted as Kohr, Masters, Coldiron, Blust & Skiffington (1989) had done for their analysis. There were significant mean differences between the six high schools: Adams and Langley; Adams and Roosevelt; Adams and Baker; Davis and Baker; Roosevelt and Baker; Salem and Baker; Langley and Davis; Langley and Roosevelt and Langley and Salem high schools. The findings relating to teacher predictions of student performance show that lower socioeconomic status is predictive of lower performance in Algebra II which again supports the literature in this area (Holman, Gonzalez & McNeil, 1993; Kohr, Masters, Coldiron, Blust & Skiffington, 1989; Willie, 2001). Explanations may include the need for more resources and/or programs for these students or the need for more teachers or more experienced teachers for these students. Equitable resources for schools and students, regardless of the student make-up and gender of the student population are also very important in bridging the gap which may exist in districts and communities. In conclusion, ethnicity and socioeconomic status of the students are highly predictive of their predicted student achievement. Teachers are perceived as favoring students by gender.

Perception Gap

Analysis of the difference between the Algebra II grade the students received for the course and the teacher predicted score resulted in a perception gap. Analysis of this gap further supports the research that there is a gender gap (t=-10.35, p=.000) and an ethnic gap (t=-5.53, p=.001) and a gap evident when combining ethnicity and gender (t=2.34, p=.019). African Americans and White students comprised the majority of the sample, so the marginal effect analysis focused on these groups. Tables 18 and 19 (p. 75) display the mean differences and marginal effects which conclude that males are more highly underrated than females and Whites are more highly underrated than African Americans. White males are particularly underrated. Teachers were good predictors of achievement for White females and Black females; the mean difference for these groups was significant though small (.034 and -.077, respectively).

Limitations

There are limitations in this study which must be addressed to enhance future research. The identified limitations include sample size and access to some data. In this case, the socioeconomic status of the student sample is a limitation as is the inability to obtain socioeconomic status of individual students.

A possible limitation may be the sample size. This study was done with a relatively small sample, that is, from one suburban school district in the state of North Carolina. However, the entire high school Algebra II student population for each of the selected test administrations in the Barton School District was used in this research and the research holds implications for practice in Barton and similar districts. (See Table 1, p. 47.) Even so, there were relatively small numbers of students who are Native American; Hispanic; Multiracial and Asian. This affects the ability of the researcher to generalize

the results to these ethnic groups and to the larger population of mathematics teachers and students. However, this research will hopefully satisfy the desire of the local urban district for data on math student achievement as related to teacher predictions.

The main limitation of this study was the researcher's inability to obtain free and reduced lunch eligibility for each of the students in the sample. The results of the correlation analysis confirms that the SES variable is highly correlated with the teacher's predicted score and the other primary variables in the study and was evident in the literature review (Kohr, Masters, Coldiron, Bust & Skiffington, 1989, Okpala, Okpala & Smith, 2001). Statistical analyses in this study did reflect significance among the groups. This researcher had planned to use free/reduced lunch data for the sample to determine the socioeconomic status of the 4158 students in the study. To address this point, the researcher was able to determine the school's percentage of students eligible for free and reduced lunch for the included academic years and data (by high school) relating to the percentage of economically disadvantaged students earning level 1, 2, 3 or 4 on the Algebra II test. Socioeconomic status is positively predictive of academic performance as the results of this study and others show (Holman, 1995; Rong, 1995). In addition, as Holman's (1995) research confirms, minority students are likely to be from lower socioeconomic backgrounds which can be predictive of poorer performance on high stakes tests. Analyses of the perception gap and marginal effect of socioeconomic status were unreliable since the SES for each of the students in the sample was not known to the researcher and included in the data set. This research uses ethnicity and the percentage of students at each of the Barton high schools receiving free or reduced lunch as predictors of socioeconomic status.

Implications for Future Practice

Grades and test scores define students and their schools today and provide parents and students with direct and relevant feedback on the student's academic performance (Senk, Beckmann & Thompson, 1997; Stiggins & Conklin, 1992). Students study and strive for good grades and "high" test scores, encouraged by their parents and teachers, and fear poor grades and scores. As Joseph Casbarro (2005) and others (Madaus, 1988; Popham, 1999) conceptualized, student performance on high stakes tests has serious implications today for schools and how they are judged. He and others recommend to administrators and educators that student achievement is the result of multiple assessments and the teacher's perception of grades and student achievement is very important in the achievement of their students (Casbarro, 2005; Gavin & Reis, 2003). Day (1999) reminds us that the focus of today's education should be higher-order thinking skills and life-long and lasting learning and not so much a focus on tests and scores, grades, grading and high stakes tests even though they are probably here to stay. In addition, it should be the goal of all stakeholders in the education process to ensure and to provide students with rich experiences and productive learning environments free of gender, ethnic or class bias (Jones, 1995). The changing face of our communities and schools require that schools address and meet the needs of today's diverse student population (Jones, 1995).

Blount's study (1997) concluded that teachers view the effort of their students as the most direct influence on their grades, but also a majority of the teachers in Blount's study regarded a student's grade as the perception of what the student earned, though not always what the student has learned. This perception is important since it may be based on bias, behavior, grading, scoring, etc. and may hinder certain groups from higher levels

of achievement and/or careers. In addition, James Teisl et al.'s (2004) study of kindergarten teachers' perception of their students' academic performance in first grade supports the belief that teachers are accurate predictors of student achievement and adds some validation to the significance and value of teacher grading and assessment in present and future academic achievement. This research supports this notion that teachers are good predictors of student achievement, especially for African American females. In addition, each classroom should have a well-qualified teacher who is prepared to teach the required curriculum and through self-efficacy, promote high expectations for *all* of the students (Junjufu, 2002; Smith, 2005).

However, research shows that other factors affect assessment and teacher predictions of student achievement. M. Gail Jones (1995) brings attention to gender issues which will be more evident in the next century as demographics continue to change the faces of those we see in classrooms and in the workplace. Gender stereotypes are many times a part of school experiences for elementary, middle and high school students which may hamper their ability to reach their full potential. Female and male students must be aware of *all* the roles, options and opportunities available to them as we work toward gender equity. Reform efforts should include strong legislation and policies which enforce gender, ethnic and class equity at all levels for all students and include role models representing these groups in twenty-first century schools and workplaces (1995) although such efforts can be out of the direct influence of classroom teachers. Teachers and administrators can affect more impact on student achievement in mathematics by incorporating different approaches to teaching Algebra and by taking another look at the mathematics courses recommended for elementary, middle and high school students.

Teaching Algebra II, for example, to students sooner in their schooling may raise the expectations teachers, administrators and parents have for the students as well as the expectations the students have for themselves. Recognizing the (economic) global competition American students face today and in tomorrow's world, the students would benefit from additional opportunities in secondary school to take more challenging and advanced mathematics courses to make them competitive in tomorrow's marketplace. A great deal of literature and research exists which addresses the need for American schools to generate more scientists, medical personnel, engineers, mathematics teachers and the like who need the advanced mathematical knowledge to perform in these positions and help the United States remain competitive in the global marketplace.

Recommendations for Further Research

The results of this study have shown quantitative evidence of correlation between gender, ethnicity, socioeconomic status, Algebra II course grade, EOC score and teacher predictions of student performance on the Algebra II End-of-Course test. This research was limited to high school Algebra II students, but other states and possibly other EOC tested subjects should be examined using quantitative and qualitative measures. Incorporation of information related to the socioeconomic status of these students is highly recommended in further research. Since this study focused only on the teacher's predicted Algebra II course score with no additional information analyzed relating to these teachers, a more focused examination on teacher-related factors, such as teacher years of experience, gender and ethnicity would be appropriate. Incorporation of qualitative research techniques such as interviews with students and teachers or use of a survey instrument or focus group adds an extra dimension of understanding of teacher

perceptions of student achievement. Data on the experience, gender and ethnicity of the Algebra II teachers would have added another dimension to the study. It may help determine the reason(s) for the expectations teachers had for the student representing several ethnic groups—bias, experience, attendance, behavior, etc. (Smith, 2005; Tucker, Porter, Reinke et al., 2005). This would be an area in need of further research.

An article by Gary R. Howard (2007) advised educators to be mindful of rapidly growing and changing schools and the challenges of ethnic, cultural and linguistic diversity they bring. He believes it is a great opportunity rather than an obstacle—an opportunity to reexamine current practices and transform them into growth and a new understanding to better serve all students. He describes a professional development module presently being used in several school districts around the country which is having success in transforming schools into "inclusive, equitable and excellent schools" (p. 22). Additional research on the implications of demographic shifts in schools may help education stakeholders better prepare staff and students for global communities.

It would also have enhanced the study to have a better understanding of student perceptions of grading and their performance in Algebra II. Parsley and Corcoran (2003) noted the strong correlation between students' attitude toward their learning and their performance in school while the research of Brookhart (1998) analyzed the determinants of student effort and ability to meet the challenges of academic performance.

Further study of other factors, such as block scheduling or year-round schooling could help in understanding and affecting student performance in class and on high stakes tests. A great deal of research has focused on high stakes testing and its effect on student performance and achievement. James Popham's article, *All About Accountability;*

Another Bite Out of the Apple (2007) offers an evaluation of Bush's NCLB legislation. There is praise for outcomes such as focused attention on the achievement of minority students, disabled, English language learners and economically disadvantaged students, but not for two aspects of the assessment aspect of the law. Requiring that all students score at or above proficiency levels on standardized state assessments is unrealistic, according to him. Moreover, these standardized state tests may not accurately assess the quality of the instruction and may be unfairly influenced by several factors, including the SES of the students (2007). The professional community could also benefit from further research and/or training in the area of assessments and grading, particularly as they relate to gender and ethnic differences.

This researcher also believes that Algebra II should be accessible to students earlier than grades 9 to 12. These Algebra II students are essentially already "behind" if they are not taking the course until their high school years. Not encouraging and allowing more students to take Algebra II in middle school (or possibly elementary school) adds to the low expectations educators may have for students, particularly minority students and/or females (Conley, 2005; Gavin & Reis, 2003; Junjufu, 2002; Mosley, 2007; Smith, 2005). It is also the recommendation of this researcher that analysis of opportunities for minority students and underrepresented groups in math and science be researched. Tutorials, enrichment opportunities, extended day, technological opportunities and other support programs should be studied to determine their effectiveness in enhancing student achievement for students (Brown and Boshamer, 2000).

It is the hope of this researcher that the significance of this study has added to the body of knowledge theoretically and for practitioners. Regardless, this research has answered

questions of the Barton School district as it continues to make data-driven curricular decisions and hopefully will lead to increased reflective thinking among district administrators and teachers.

APPENDIX

Appendix A - District Entry Letter

4 Smith Court
XXXXX, NC 27712
February 16, 2006

Dr. Lori XXXXX
Coordinator of Research & Accountability
XXXXXX Public Schools
PO Box 1007
XXXXXX, NC 27702

Dear Dr. XXXXX:

I am a doctoral student in Curriculum and Instruction at the University of North Carolina at Chapel Hill, and I am preparing to complete my program within the next year. In addition, I am one of the Media Coordinators at XXXXXX School in the XXXXXX Public Schools.

The purpose of this letter is to request permission to conduct my research study in the XXXXX Public Schools, and in particular, include a student sample of all high school students presently enrolled in Algebra II or who have completed Algebra II during the Spring 2004, Spring 2005 and Fall 2005 semesters in all of the XXXXXXX high schools. I am anticipating that all research will be concluded by early summer of 2006.

The proposed study will analyze the math teachers' predicted Algebra II course grades; the actual course grades and the students' End-of-Course (EOC) test results in Algebra II. As you may know, this dissertation research evolved from my graduate practicum approximately one year ago. I was afforded the opportunity to help analyze Mathematics EOC scores for the 2003-04 academic year, particularly focusing on the correlation between the teacher's anticipated course grade with the score the students earned on the EOC for middle and high school students. The proposed research study, *Teacher Predictions of Student Mathematics Achievement*, will expand the original inquiry by also incorporating the gender, ethnicity and socioeconomic status of the students in addition to the students' test and grade data for the Spring 2004, Spring 2005 and Fall 2005 EOC test administrations. I am estimating that the sample will include up to 5,000 students and approximately 25 high school Algebra II teachers. I am enclosing a list of the specific variables I need to relate to student and teacher participants for the study. To protect the confidentiality and privacy of students and teachers, I am not requesting any contact information such as student or teacher names, addresses, ID numbers and phone numbers. Teacher names will be coded since I will only need to match the students to a teacher.

Every attempt will be made to protect the anonymity and privacy of all participants. Enclosed with this letter, you will find information which verifies that I have completed the required course in *the Protection of Human Research Subjects*. In addition, I have made application to the Institutional Review Board (IRB) for the University of North Carolina at Chapel Hill and have been approved to conduct the research. With this letter, I am providing a summary of the research; verification of successful completion of the online course in the treatment of human subjects and verification of approval from the Institutional Review Board of UNC; a copy of the required consent forms and a copy of the research proposal.

I am excited at the opportunity to continue this research study to address the research questions I have identified and determine how teacher grades and grading predictions correlate to student achievement. I am hoping that the study will help educators better understand the factors which may affect student achievement. Indirectly, this research may contribute to enhancing

student learning and assist schools in meeting NCLB and other legislative requirements. It is my hope that ultimately, this study will enhance the profession and contribute to research in education.

Sincerely,

Ms. Kim Mayo, Doctoral Student

Dr. Barbara Day, Faculty Advisor & Professor
School of Education
University of North Carolina – Chapel Hill

Data Set Variables Requested

1. ***Student Data:***
   - ***Algebra II End-of-Course(EOC) test grade***
   - ***EOC administration date (Spring 2004, Spring 2005 or Fall 2005 only)***
   - ***Gender***
   - ***Ethnic group***
   - ***Algebra II teacher (coded name)***
   - ***Algebra II course grade***
   - ***High School***
   - ***Grade***
   - ***Eligibility for free/reduced lunch***
   - ***Teachers anticipated course grade (as reported for the administration of the Algebra II EOC)***

2. ***Teacher Data:***
   - ***Name (coded)***
   - ***School***

CITI Course in The Protection of Human Research Subjects

Friday, March 25, 2005

CITI Course Completion Record
for Kim Mayo

To whom it may concern:

On *3/25/2005*, *Kim Mayo* (username=xxxx) completed all *CITI Program* requirements for the *Basic CITI* Course in The Protection of Human Research Subjects.

Learner Institution: *University of North Carolina at Chapel Hill*

Learner Group: *Group 2*

Learner Group Description: ***Social and Behavioral Research:*** *Studies on sociological, psychological, anthropological or educational phenomena that typically involve direct contact with subjects. Does not include drug or device studies.*

Contact Information:

Gender: Female

UNC Affiliation: Affiliated

UNC PID: xxxxxxxxxxx

Department: School of Education

Which course do you plan to take?: Social & Behavioral Investigator Course Only

Role in human subjects research: Student Researcher

May we re-contact you to complete a course questionnaire?: Yes

Mailing Address:

4 Smith Court
XXXXXX
NC
XXXXXX
US

Email: mayokp@xxxx.xxx

Office Phone: 919-XXX-XXXX

Home Phone: 919-xxx-xxxx

The Required Modules for *Group 2* are:	**Date completed**
Introduction	03/24/05
History and Ethical Principles - SBR	03/24/05
Defining Research with Human Subjects - SBR	03/24/05
The Regulations and The Social and Behavioral Sciences – SBR	03/24/05
Assessing Risk in Social and Behavioral Sciences – SBR	03/24/05
Informed Consent – SBR	03/24/05
Privacy and Confidentiality - SBR	03/24/05
Records-Based Research	03/25/05
Research With Protected Populations - Vulnerable Subjects: An Overview	03/25/05
Group Harms: Research With Culturally or Medically Vulnerable Groups	03/25/05

Workers as Research Subjects-A Vulnerable Population	03/25/05
Conflicts of Interest in Research Involving Human Subjects	03/25/05
HIPAA and Research at UNC- Chapel Hill	03/25/05
Additional optional modules completed:	**Date completed**

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

Appendix C

Joint Education/Agriculture Letter About the Use of Student Information Collected Pursuant to the National School Lunch Program

December 17, 2002

Dear Colleague:

As schools across the country begin to implement the No Child Left Behind Act (NCLB), the milestone elementary and secondary education legislation signed into law by President Bush at the beginning of 2002, a number of school officials have raised questions about the use of student information collected pursuant to the National School Lunch Program in carrying out provisions of Title I of the Elementary and Secondary Education Act, as reauthorized by NCLB. The purpose of this letter is to respond to those concerns.

Educators have specifically asked whether it is permissible to use information from the school lunch program in disaggregating student assessment scores, in determining student eligibility for supplemental educational services, and under certain circumstances, in prioritizing opportunities for public school choice.

Title I, Part A of the Elementary and Secondary Education Act (as reauthorized by the No Child Left Behind Act)

States and local educational agencies (LEAs) receiving funding under Title I, Part A must assess and report on the extent to which students in schools operating Title I programs are making progress toward meeting State academic proficiency standards in reading or language arts and in mathematics. Title I now requires States and LEAs to measure and report publicly on the progress of all students, and of students in various population groups, including students who are economically disadvantaged. If assessment results show that any of the groups has not made adequate yearly progress toward meeting State achievement standards for two consecutive years, the LEA must identify that school as needing improvement. All students attending the school must be given the opportunity to attend other public schools that have not been identified as needing improvement, with priority given to the lowest-achieving students from low-income families. In addition, once a school has failed to make adequate yearly progress for three years, the LEA must provide economically disadvantaged students who attend

that school the opportunity to obtain supplemental educational services from a nonprofit, for-profit, or public provider.

For many LEAs, information from the National School Lunch Program is likely to be the best, and perhaps the only source of data available to hold schools accountable for the achievement of "economically disadvantaged" students, and also to identify students as eligible to receive supplemental educational services or to receive priority for public school choice. Moreover, in the case of the priority for public school choice and eligibility for supplemental educational services, the law specifically requires LEAs to use the same data they use for making within-district Title I allocations; historically, most LEAs use school lunch data for that purpose. After examining these new requirements, State and local officials have inquired as to whether they may use school lunch data to meet these requirements while remaining in compliance with the student privacy provisions of the National School Lunch Act.

National School Lunch Act

Section 9 of the Richard B. Russell National School Lunch Act (NSLA) establishes requirements and limitations regarding the release of information about children certified for free and reduced price meals provided under the National School Lunch Program. The NSLA allows school officials responsible for determining free and reduced price meal eligibility to disclose aggregate information about children certified for free and reduced price school meals. Additionally, the statute permits determining officials to disclose the names of individual children certified for free and reduced price school meals and the child's eligibility status (whether certified for free meals or reduced price meals) to persons directly connected with the administration or enforcement of a Federal or State education program. This information may be disclosed without parental consent.

Because Title I is a Federal education program, determining officials may disclose a child's eligibility status to persons directly connected with, and who have a need to know, a child's free and reduced price meal eligibility status in order to administer and enforce the new Title I requirements. The statute, however, does not allow the disclosure of any other information obtained from the free and reduced price school meal application or obtained through direct certification. School officials must keep in mind that the intent of the confidentiality provisions in the NSLA is to limit the disclosure of a child's eligibility status to those who have a "need to know" for proper administration and enforcement of a Federal education program. As such, we expect schools to establish procedures that limit access to a child's eligibility status to as few individuals as possible.

We urge school officials, prior to their disclosing information on the school lunch program eligibility of individual students, to enter into a memorandum of understanding or other agreement to which all involved parties (including both school lunch administrators and educational officials) would adhere. This agreement would specify the names of the individuals who would have access to the information, how the information would be used in implementing Title I requirements, and how the information would be protected from unauthorized uses and third-party disclosures, and would include a statement of the penalties for misuse of the information.

Other Provisions

We also note that NCLB did not alter other provisions of Title I under which school officials have historically made use of National School Lunch Program data. LEAs are still required to rank, annually, their school attendance areas, by percentage of students from low-income families, in order to determine school eligibility and to make Title I within-district allocations based on the number of poor children in each school attendance area. They must also determine the amount of funds available to provide services to eligible private school students within the district, again using data on students who are from low-income families. Many LEAs have, for many years, used National School Lunch Program data in making these calculations, which do not involve the release of information on the school lunch eligibility of individual students. They may continue to do so under the new law, while respecting the limitations on the public release of those data described above.

We hope the above information clarifies what we know has been a matter of great concern in States and school districts. If you desire more detailed information about public school choice and supplemental educational services, it can be found at the OESE Legislation page.

We will also be providing guidance on Provisions 2 and 3 of the National School Lunch Program and the impact of NCLB on those provisions in the near future.

If we can be of further assistance, please contact one of our offices.

Sincerely,

Eric M. Bost
Under Secretary
Food, Nutrition, and Consumer Services
U.S. Department of Agriculture

Susan B. Neuman
Assistant Secretary for
Elementary and Secondary Education
U.S. Department of Education

Joint U.S. Department of Education and Department of Agriculture Letter Providing Guidance on Implementation of the New Requirements of Title I by Schools that Operate School Lunch Programs

February 20, 2003

Dear Colleague:

This is a follow-up to our letter of December 17, 2002, in which we promised to provide guidance on the implementation of the new requirements of Title I of the Elementary and Secondary Education Act (ESEA), as reauthorized by the No Child Left Behind Act (NCLB), by schools that operate school lunch programs under Provision 2 and Provision 3 of the National School Lunch Program.

As noted in our earlier letter, States and local educational agencies (LEAs) receiving funding under Title I, Part A of the ESEA must assess and report annually on the extent to which students in schools operating Title I programs are making progress toward meeting State academic proficiency standards in reading or language arts and in mathematics. States and LEAs must also measure and report publicly on the progress of all students, and of students in various population groups, including students who are economically disadvantaged. If assessment results show that any of the groups has not made adequate yearly progress toward meeting State achievement standards for two consecutive years, the LEA must identify that school as needing improvement. All students attending the school must be given the opportunity to attend other public schools that have not been identified as needing improvement, with priority given to the lowest-achieving students from low-income families. Once a school has failed to make adequate yearly progress for three years, the LEA must provide economically disadvantaged students who attend that school the opportunity to obtain supplemental educational services from a non-profit, for-profit, or public provider.

For many LEAs, information from the National School Lunch Program is likely to be the best, and perhaps the only, source of data available to hold schools accountable for the achievement of "economically disadvantaged" students, and also to identify students as eligible to receive supplemental educational services or to receive priority for public school choice. Moreover, in the case of the priority for public school choice and eligibility for supplemental educational services, the law specifically requires LEAs to use the same data they use for making within-district Title I allocations; historically, most LEAs use school lunch data for that purpose. As we outlined in our original letter, school lunch data may be used for these purposes. However, using school lunch data in schools that have implemented Provision 2 or 3 of the school lunch program poses issues that require further explanation, because these schools do not determine free and reduced price lunch eligibility on an annual basis.

The National School Lunch Act allows schools that offer students lunches at no charge, regardless of individual students' economic status, to certify students as eligible for free and reduced price lunches once every four years and longer under certain conditions. These alternatives to the traditional requirements for annual certification, known as "Provision 2" and "Provision 3," reduce local paperwork and administrative burden. The school lunch regulations prohibit schools that make use of these alternatives from collecting eligibility data and certifying students on an annual basis for other purposes. This prohibition has raised issues about how such schools can obtain the data they need to disaggregate Title I assessment data, identify students as eligible for supplemental educational services, and determine which students receive priority for public school choice, all of which Title I requires be done annually.

We have determined that, for purposes of disaggregating assessment data and for identifying students as "economically disadvantaged" in implementing supplemental educational services and the priority for public school choice, school officials may deem all students in Provision 2 and 3 schools as "economically disadvantaged." In addition, when determining Title I eligibility and allocations for a Provision 2 or 3 school, LEA officials may assume that the school has the same percentage of students eligible for free and reduced price lunches as it had in the most recent year for which the school collected that information.

We hope this guidance clarifies this issue. For more detailed information about public school choice and supplemental educational services please see the OESE Legislation page.

If we can be of further assistance, please contact one of our offices.

Sincerely,

Eric M. Bost
Under Secretary
Food, Nutrition, and Consumer Services
U.S. Department of Agriculture

Eugene W. Hickok
Under Secretary
U.S. Department of Education

REFERENCES

Anderson, E. S. and Keith, T. Z. (2001). A longitudinal test of a model of academic success for at-risk high school students. *Journal of Educational Research, 90*(5), 259-271.

Anderson, K. E. & Wendel, F. C. (1988). Pain relief: Make consistency the cornerstone of your policy on grading. *American School Board Journal, 175*(10), 36-37.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Barnett, J. E., Sink, C. A. and Hixon, J. E. (1993, April). *Perceptions of scholastic competence and their relation to Middle School achievement*. Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.

Bempechat, J. (1999). Achievement and motivation in poor and minority children. *Brown University Child and Adolescent Behavior Letter, 15*(7), 1-2.

Bertram, B. and Newman, S. (1981). *Why readability formulas fail*. Reading Education Report No. 28. Illinois University, Urbana. Center for the Study of Reading. (ERIC document service number ED205915).

Blount, H. P. (1997). The keepers of numbers: Teachers' perspectives on grades. *The Educational Forum, 61*, 329-334.

Brookhart, S. M. (1998). Determinants of student effort on schoolwork and school-based achievement. *The Journal of Educational Research, 91*, 201-208.

Brown, F. & Boshamer, C. C. (2000). Using computer assisted instruction to teach

mathematics: A study. *The Journal of the National Alliance of Black School Educators, 4*(1), 62-72.

Bursuck, W. D., Munk, D. & Olson, M. (1999). The fairness of report card grading adaptations. What do students with and without learning disabilities think? *Remedial and Special Education, 20*, 84-92.

Casbarro, J. (2005). The politics of high stakes testing. *Principal,* 16-20.

Coleman, J. M. & Dover, G. M. (1993). The RISK screening test: using kindergarten Teachers' ratings to predict future placement in resource classrooms. *Exceptional Children, 59*, 468-477.

Conley, M. W. (2005). A study of the impact of teacher expectations, staff development for teachers and mastery learning on student achievement in reading comprehension. (University of Chicago, 2005). *Dissertation Abstracts International A, 66*(3), 899. (AAT No. 3168331).

Day, B. D. (1999). *Teaching and learning in the new millennium*. Indianapolis, IN: Kappa Delta Pi International Honor Society in Education.

Deuel, L. S. (1999). Block scheduling in large, urban high schools: Effects on academic achievement, student behavior and staff perceptions. *The High School Journal*, *83*(1), 14-25.

Dusek, J. B. (1975). Do teachers bias children's learning? *Review of Educational Research*, *45*(4), 661.684.

Eineder, D. V., and Bishop, H. L. (1997). Block scheduling and high school: The effects on achievement, behavior, and student-teacher relationships. *NASSP Bulletin, 81*, 45-54.

Ekstrom, R. B. (1994). Gender differences in high school grades: an exploratory study. *College Board Report No. 94-3, College Board Publications,* 2-38.

Ercikan, K., McCreith, T. and Lapointe, V. (2005). Factors associated with mathematics achievement and participation in Advanced mathematics courses: An examination of gender differences from an international perspective. *School Science and Mathematics, 105*(1), 5-14.

Gage, N. L. (1994). The scientific status of research on teaching. *Educational Researcher, 44 (*4), p. 371-383.

Gavin, M. K. and Reis, S. M. (2003). Helping teachers to encourage talented girls in math. *Gifted Child Today. 26*(1), 32-44.

Geary, D. C. (1996). Sexual selection and sex differences in mathematical abilities. *Behavioral and Brain Sciences, 19*, 229-284.

Gibson, S. D. (1997). A comparative study of previous achievement indices for two groups of ninth grade students: those who passed and those who failed sections of the Ohio Ninth Grade Proficiency Test. *American Secondary Education*, *26*, 2-6.

Glesne, C. (1999). *Becoming Qualitative Researchers: An introduction*. (pp. 37). New York: Addison Wesley Longman.

Green, S. B. and Salkind, N. J. (2003). *Using SPSS for windows and Macintosh: Analyzing and understanding data*. Upper Saddle River, NJ: Prentice Hall.

Greenwald, R., Hedges. L. and Laine, R. (1996). Resource allocation in classrooms: An economic analysis. *Review of Educational Research, 66*(3), 361-396.

Griffith, J. (1996). Relation of parental involvement, empowerment, and school traits to student academic performance. *The Journal of Educational Research*, *90*, 33-41.

Grobe, W. J. and McCall, D. (2004). Valid uses of student testing as part of authentic and comprehensive student assessment, school reports, and school system accountability. *Educational Horizons, 82*(2), 131-142.

Guskey, T. R. (2001). High percentages are not the same as high standards. *Phi Delta Kappan, 82*(7), 534-542.

Hanich, L. B. and Jordan, N. C. (2004). Achievement-related beliefs of third-grade children with mathematics and reading difficulties. *Journal of Educational Research, 97*(5), 227-233.

Helwig, R., Anderson, L. and Tindal, G. (2001). Influence of elementary student gender on teacher's perceptions of mathematics achievement. *The Journal of Educational Research*, *95*(2), 93-102.

Hewitt, M. A. and Homan, S. P. (2001). Readability. In R.A. Thompson (Ed.) *Classroom reading instruction* (pp. 305-318). Dubuque, IA: Kendall/Hunt.

Hewitt, M. A. and Homan, S. P. (2004). Readability level of standardized test items and student performance: The forgotten validity variable. *Reading Research and Instruction, 43*(2), 1-16.

Hickman, C. W. (1995). High school parent involvement: Relationships with achievement, grade level, SES, and gender. *Journal of Research and Development in Education, 28*, 125-134.

Holman, L. J., Gonzalez, M. L., & McNeil, K. (1993). Implications of high stakes testing in U.S.-Mexico border areas. Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.

Holman, L. J. (1995, April). Impact of ethnicity, class and gender on achievement of

Border area students on a high-stakes examination. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Howard, G. R. (2007). As diversity grows, so must we. *Educational Leadership, 64*(6), 16-22.

Hyde, J. S., Fennema, E. & Lamon, S. J. (1990). Gender differences in mathematics performance: A meta-analysis. *Psychological Bulletin, 107*, 139-155.

Jones, M. G. (1995). Gender equity for the twenty-first century. In B. D. Day (Ed.), *Education for the 21st century key issues: Leadership, literacy, legislation, learning* (pp. 425-440). Dubuque, IA: Kendall-Hunt Publishing Company.

Jones, M. G., Jones, B. D., Hardin, B., and others. (1999). The impact of high-stakes testing on teachers and students in North Carolina. *Phi Delta Kappan*, *81*(3), 199-203.

Junjufu, K. (2002). Black students: Middle class teachers. Chicago, IL: African American Images.

Jussim, L. J. & Eccles, J. (1995). Are teacher expectations biased by students' gender, social class, or ethnicity? In Y. Lee, L. J. Jussim & C. R. McCauley (Eds.), *Stereotype accuracy: Toward appreciating group differences* (pp. 245-271). Washington, DC: American Psychological Association.

Keller, C. (2001). Effect of teachers' stereotyping on students' stereotyping of mathematics as a male domain. *The Journal of Social Psychology, 141*(2), 165-173.

Kohr, R. L., Masters, J. R., Coldiron, J. R., Blust, R. S. and Skiffington, E.W. (1989). The relationship of race, class, and gender with mathematics achievement for

fifth-, eighth-, and eleventh-grade students in Pennsylvania schools. *Peabody Journal of Education, 66*(2), 147-169.

Lee, K. (1996). A study of teacher responses based on their conceptions of intelligence. *Journal of Classroom Interaction*, *31*, 1-12.

Leedy, M. G., LaLonde, D. & Runk, K. (2003). Gender equity in mathematics: Beliefs of students, parents and teachers. *School Science and Mathematics, 103*(6), 285-292.

Madaus, G. F. (1988). The influence of testing on the curriculum. In Laurel Tanner (Ed.) *Critical issues in curriculum: 87th NSSE Yearbook, Part I* (pp. 83-121). Chicago, IL: University of Chicago Press.

McCoy, L. P. (2005). Effect of demographic and personal variables on achievement in eighth-grade Algebra. *Journal of Education Research, 98(3)*, 131-135.

Mitchell, K. J. (1997). What happens when school reform and accountability testing meet? *Theory Into Practice*, *36*, 262-265.

Moote, G. & Wodarski, J. (1997). The acquisition of life skills through adventure-based activities and programs: A review of the literature abstract, *Adolescence, 32*(125), 143-167.

Mosley, M. L. (2007). The relationship of gender, socioeconomic status and attendance on math achievement of seventh grade students. (Doctoral dissertation, The University of Alabama, 2007). *Dissertation Abstracts International A*. (AAT No. 3223317).

Munk, D. D. & Bursuck, W. (2001). What report card grades should and do communicate: perceptions of parents of secondary students with and without

disabilities. *Remedial and Special Education*, *22*(5), 280-287.

National Council of Teachers of Mathematics (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Natriello, G. (1992). *Marking systems*. In Encyclopedia of Educational Research (6th ed.), Englewood Cliffs, NJ: Prentice Hall.

Natriello, G. and McGill, E. L. (1986). Performance standards, student effort on homework, and academic achievement. *Sociology of Education, 16*, 153-222.

Neibuhr, K. & Neibuhr, R. (1999). An empirical study of student relationships and academic achievement. *Education, 119*(4), 679-681.

North Carolina Department of Public Instruction. (2003). *End of Course Instructor Manual, 2003*. Raleigh, NC: NC Department of Public Instruction.

North Carolina Department of Public Instruction. (2004). *Understanding the North Carolina End-of-Course tests*. Raleigh, NC: NC Department of Public Instruction.

North Carolina Department of Public Instruction. (2005a). *Student test scores highest ever; 70 Percent of schools meet federal standards*. Retrieved February 27, 2005, from http://www.ncpublicschools.org/abcs/0304/pressrelease.html

North Carolina Department of Public Instruction. (2005b). *Testing started with the ABCs and other myths about testing and accountability in North Carolina*. Retrieved February 17, 2005, from http://www.ncpublicschools.org/parents/myths.html

North Carolina Department of Public Instruction. (2006). *Accountability services division: Achievement level information*. Retrieved November 28, 2006, from http://www.dpi.state.nc.us/accountability/testing/shared/achievelevel/eoc .

O'Connor, L. A. (2001). The ecology of the black-white test score gap: What we know

and what matters. *Dissertation Abstracts International.* (UMI No. 3028569).

O'Connor, S. A. and Miranda, K. (2001). The linkages among family structure, self-concept, effort and performance on mathematics achievement of American high school students by race. *American Secondary Education, 31*(1), 72-95.

Okpala, C. O., Okpala, A. O. and Smith, F. E. (2001). Parental involvement, instructional expenditures, family socioeconomic attributes, and student achievement. *Journal of Educational Research , 95*(2), 110-115.

O'Shea, M.D. (2006). Student perceptions of teacher support effect on student achievement. (Doctoral dissertation, Bowling Green State University, 2006). *Dissertation Abstracts International A*. (AAT No. 3209236).

Parsley, K. & Corcoran, C. A. (2003). The classroom teacher's role in preventing school failure. *Kappa Delta Pi Record*, *39*(2), 84-87.

Popham, W. J. (2007). All about accountability; Another bite out of the apple. *Educational Leadership, 64*(6), 83-84.

Popham, W. J. (1999). Why standardized tests don't measure educational quality. *Educational Leadership, 56*(6), 223-233.

Reynolds, A. J. (1992). Comparing measures of parental involvement and their effects on academic achievement. *Early Childhood Research Quarterly, 7*(3), 441-462.

Reynolds, A. J., Weissberg, R. P. and Kasprow, W. J. (1992). Prediction of early social and academic adjustment of children from the inner city. *American Journal of Community Psychology, 20*(5), 599-624.

Rong, X. L. (1996). Effects of race and gender on teachers' perceptions of the social behavior of elementary students. *Urban Education, 31,* 261-290.

Sadker, D. & Zittleman, K. (2004). Test anxiety: are students failing tests—or are tests failing students? *Phi Delta Kappan*, *85*(10), 740-751.

Senk, S. L., Beckmann, C. E. and Thompson, D. R. (1997). Assessment and grading in high school mathematics classrooms. *Journal of Research in Mathematics Education*, *28*, 187-215.

Seuss & Smith, L. (1995). *Hooray for Diffendoofer Day!* New York, NY: Knopf.

Slocumb-Bradford, A. (2003). The influence of non-cognitive variables on African-American high school students' enrollment in advanced mathematics courses. *Dissertation Abstracts International A*, *64*(5), 1573. (AAT No. 3090078).

Smith, T. T. (2005). Race, pedagogy and practice: A qualitative study of African American teachers and socioeconomically disadvantaged African American urban school students. (Doctoral dissertation, Saint Joseph's University, 2005). *Dissertation Abstracts International A*. (AAT No. 3170267).

Sparks, R. L. and Ganschow, L. (1996). Teachers' perceptions of students' foreign language academic skills and affective characteristics. *The Journal of Educational Research, 89*, 172-185.

Stevens, T., Olivarez, Jr., A and Lan, W. Y. and Talbert-Runnels. (2004). Role of mathematics self-efficacy and motivation in mathematics performance across equity. *The Journal of Educational Research*, *97*(4), 208-221.

Stiggins, R. J. and Conklin, N. F. (1992). *In teachers' hands: Investigating the practices of classroom assessment*. Albany, NY: SUNY Press.

Sui-Chu, E. H. & Willms, J. D. (1996). Effects of parental involvement on eighth-grade

achievement. *Sociology of Education, 69*, 126-141.

Tajalli, H. and Opheim, C. (2004). Strategies for closing the gap: Predicting student performance in economically disadvantaged schools, *Educational Research Quarterly, 28*(4), 44-54.

Tartre, L. A. and Fennema, E. (1995). Mathematics achievement and gender: A longitudinal study of selected cognitive and affective variables (grades 6-12). *Educational Studies in Mathematics, 28*, 199-217.

Teisl, J.T., Mazzocco, M. M. & Myers, G. F. (2001). The utility of kindergarten teacher ratings for predicting low academic achievement in first grade. *Journal of Learning Disabilities*, *34*(3), 286-293.

Terwilliger, J. S. (1977). Assigning grades—Philosophical issues and practical recommendations. *Journal of Research and Development in Education, 10*(3), 21-39.

Thompson, G. L., Warren, S. and Carter, L. (2004). It's not my fault: Predicting high school teachers who blame parents and students for students' low achievement. *High School Journal, 87*(3), 5-14.

Trochim, W. M. (2001). *The research methods knowledge base*. (2nd ed). Cincinnati, OH: Atomic Dog Publishing Company.

Tucker, C. M., Porter, T., Reinke, W. M. and others. (2005). Promoting teacher efficacy for working with culturally diverse students. *Preventing School Failure*, *50*(1) 29-35.

United States Department of Agriculture Food and Nutrition Service. (2007). *National school lunch program: Fact Sheet*. Retrieved April 4, 2007 from

http://www.fns.usda.gov/cnd/Lunch/AboutLunch/NSLPFactSheet.htm .

United States Department of Education. (2006a). *Joint Education/Agriculture letter about the use of student information collected pursuant to the National School Lunch Program.* Retrieved December 14, 2006 from http://www.ed.gov/programs/titleiparta/letter121702.html .

United States Department of Education. (2006b). *Joint U.S. Department of Education and Department of Agriculture letter providing guidance on implementation of the new requirements of Title I by schools that operate school lunch programs.* Retrieved December 14, 2006 from http://www.ed.gov/programs/titleiparta/22003.html .

Ware, W. (2004). [Basic statistics]. Graduate class notes for Educ 184.

Williams, T. (1976). Teacher prophecies and the inheritance of inequality. *Sociology of Education, 49*, 223-236.

Willie, C. V. (2001). The contextual effects of socioeconomic status on student achievement test scores by race. *Urban Education, 36*(4), 461-478.

Wilson, J. & Wright, C. R. (1993). The predictive validity of student self-evaluations, teachers' assessments, and grades for performance on the verbal reasoning and numerical ability scales of the differential aptitude test for a sample of secondary school students attending rural Appalachia schools. *Education and Psychological Measurement, 53*, 259-270.

Wright, E. F. (1998). Connecting teaching and testing. *Thrust for Educational Leadership*, *27*, 10-12.

Yarbrough, T. L. (1999). Teacher perceptions of the North Carolina ABC program and

the relationship to classroom practice. (Doctoral dissertation, University of North Carolina at Chapel Hill, 1999). *Dissertation Abstracts International, A-60,* 2359.