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Jeanne Williams Holland

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ARE MISSISSIPPI STUDENTS ACHIEVING AT A HIGHER RATE AS A RESULT
OF NATIONAL BOARD CERTIFIED TEACHERS?

By

Jeanne Williams Holland

A Dissertation
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy
in Curriculum and Instruction
in the Department of Curriculum and Instruction

Mississippi State, Mississippi

May 2006

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2006

ARE MISSISSIPPI STUDENTS ACHIEVING AT A HIGHER RATE AS A RESULT
OF NATIONAL BOARD CERTIFIED TEACHERS?

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Pages in Study: 77

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The purpose of this study was to determine if there was a statistically significant difference between the MCT scores (reading, math, and language arts) of two groups of students (those taught by a NBCT and those who were not), and if there was a difference, how those differences can be explained based on selected teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and National Board Certification status). Teachers' National Board Certification (NBC) status and age were identified as variables that contribute to the difference in the reading, language arts, and math Mississippi Curriculum Test (MCT) scores. Students who were taught by National Board Certified Teachers (NBCTs) are more likely to have higher reading and language arts standardized test scores than students who were taught by non-NBCTs. While researchers have also concluded that teachers' years of experience, endorsement area (s), and highest degree received play a vital role in the differences found in students' achievement, this study did not confirm

those findings. The results of this study, however, indicated that teachers whose ages ranged from 41-50 tend to have higher reading, language arts, and math MCT scores. The majority of teachers in this age group were NBCTs.

DEDICATION

I would like to dedicate this research to my family, who has supported all of my educational endeavors. To my parents, Georgia and Hal, and my sisters, Barra and Ann Ross, who have always encouraged me to fulfill my goals. To my grandparents, Dee, Papa, and Lele, who have provided guidance and wisdom throughout the years. Finally, to my husband, Jody, who has endured many years of my education. Thank you for supporting me through every step of this process.

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I would like to express my appreciation to all of those who provided me with assistance with this research. To Dr. Dwight Hare, who provided immediate feedback, support, and motivation throughout this process. Thank you for being an extraordinary mentor. To Dr. Cathy Grace, who provided me with an opportunity to discover my new role as a researcher. To Dr. Jeanne Swafford, who supplied encouragement and guidance throughout the development of this research. To Dr. Nicole Thompson, who provided continuous support and direction. To Dr. Louise Davis, who also provided assistance with this research.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Educational reform has been at the forefront of American citizens' minds throughout the past several decades. Federal reports have been issued which have prompted educator accountability in determining the most effective methods of increasing student achievement. Within the past five years, federal legislation has been passed that, in essence, promotes the reorganization and improvement of education across the US. Various research studies as well as the federal government have pinpointed teachers as integral in the educational processes of students. The National Board for Professional Teaching Standards (NBPTS) is a nationwide voluntary certification system that was created with the intention of constructing evaluative criteria to recognize teachers who are considered highly accomplished. Teachers who are granted certification are considered to be experts in the current content area in which they are teaching as well as highly qualified to utilize a myriad of instructional methods.

Review of the Literature

Historical Framework of Education Reform in the US

In the late 1950s, the US was preparing to launch the world's first satellite, only to be preempted by the Soviet Union on October 4, 1957 when they successfully

launched the first artificial satellite, Sputnik I. The US, a formidable power in the world, had created a satellite that paled in comparison to USSR's Sputnik I. In the ensuing days, the US began a national re-examination of schools and their curriculum. The advances in technology as well as science and math in countries around the globe prompted the US to initiate educational reform efforts nationwide. The US altered the instructional focus in schools to reflect a strong science, technology, and mathematics framework. Reading, language arts, and writing were not central to the US reform efforts. Educators were pressed to provide rigorous instruction and evaluation related to mathematics and science. After the initial shock of Sputnik I's launch, the US struggled to remain the world's leader in education (National Commission on Excellence in Education, 1983).

The National Commission on Excellence in Education (1983) was created in 1981 by President Ronald Reagan to evaluate the educational system in the US and provide a report of findings to American citizens. The National Commission on Excellence in Education investigated the crises in the US educational system and offered solutions. Some 20 years ago, the publication of *A Nation at Risk: The Imperative for Educational Reform* (1986), commissioned by President Ronald Reagan, explored the "mediocrity" (p. 6) of educational performance in the US. Our nation's educational system had deflated after the "Sputnik Challenge" (p. 6) rather than becoming responsive to our competitors. President Reagan was concerned with the status of education in the US in comparison to international advances in the fields of math and science. Even though reform efforts had occurred, an increase in students' math, science, and technological skills had not been verified. In fact, comparisons between student achievement in the US

and internationally indicated that students in the US were far behind students abroad. *A Nation at Risk: The Imperative for Educational Reform* reported that students' achievement was lower than before the launch of Sputnik I.

Sanders and Horn (1998) reported that Tennessee, in 1984, enacted the Comprehensive Education Reform Act, which implemented a performance-based assessment of teachers through the use of portfolios. After a year, portfolio evaluation was halted due to teachers' vehement opposition to the magnitude of work involved in the process. In 1992, the Education Improvement Act was enacted in Tennessee to ensure rigorous teacher assessment so that students' achievement scores would increase. The reform included data collection related to teacher performance and student achievement. Sanders and Horn utilized the Tennessee data system which tracks teachers over time and links them to their students' achievement test scores. Sanders developed the Tennessee Value-Added Assessment system, coined "Sanders methodology", in which teachers are evaluated according to their effectiveness as measured by their students' achievement test scores which are a part of the Tennessee Comprehensive Assessment Program. Sanders and Horn defined teacher efficacy as “whether students learn that which is purportedly taught” (p. 2). Teacher efficacy was found to have more impact on student achievement than any other school characteristic, and teacher efficacy continued to influence students' achievement for many years.

Following the National Commission on Excellence in Education's publication of *A Nation at Risk: The Imperative for Education Reform* in 1983, the Carnegie Forum on Education and the Economy assembled a task force to address the issue of improving the

education of children in the US. The Carnegie Task Force (1986) replied to the crisis in America by publishing, *A Nation Prepared: Teachers for the 21st Century*. The task force addressed the issue of various professional national certification systems in a range of fields that require professionals to be highly qualified. The report responded to the diminishing population of qualified teachers by calling for the creation of the National Board for Professional Teaching Standards (NBPTS) in which high standards are implemented for what accomplished teachers should know and be able to do. The Carnegie Forum believed that it was necessary to create “a profession equal to the task—a profession of well-educated teachers prepared to assume new powers and responsibilities to redesign schools for the future” (NBPTS, n.d.a, p. 1). The rigorous standards created in the voluntary national certification system were to provide a model for educational reform.

In summary, the US became concerned after Russia launched their satellite, Sputnik I, prior to the US’s launch of their own satellite. The concerns that steamed from Russia’s technological advance provided a foundation for curricular reform in math, science, and technology. Following this curriculum reform were reforms that focused on the teacher, such as the call for the National Board for Professional Teaching Standards, which provided a voluntary national certification system that would encourage teachers to become more knowledgeable about their specific curriculum area as well as focus on professionalism.

History of NBPTS

NBPTS, created in 1987, is a nonprofit, nonpartisan organization governed by a board of directors, mostly consisting of classroom teachers. Other members of the board are school administrators, school board members, governors, state legislators, higher educators, and business and community leaders. The purpose and mission of NBPTS are stated as follows:

National Board for Professional Teaching Standards is rooted in the belief that the single most important action this country can take to improve schools and student learning is to strengthen teaching. The National Board for Professional Teaching Standards is leading the way in making teaching a profession dedicated to student learning and to upholding high standards for professional performance. We have raised the standards for teachers, strengthened their educational preparation through the standards, and created performance-based assessments that demonstrate accomplished application of the standards. The mission is to advance the quality of teaching and learning by:

- maintaining high and rigorous standards for what accomplished teachers should know and be able to do,
- providing a national voluntary system certifying teachers who meet these standards, and
- advocating related education reforms to integrate National Board Certification in American education and to capitalize on the expertise of National Board Certified Teachers. (Kelly, 1989, p. 2)

According to NBPTS (1994), the success of the National Board came from the power of a good idea: Quality teachers are necessary for student learning.

Five NBPTS Core Propositions

The five core propositions of NBPTS (1994) were constructed to provide a foundation for what proficient teachers should know and be able to do. The following are the five core propositions.

- Teachers are committed to students and their learning.

Highly qualified teachers believe that all students can learn and are determined to assist all students in achieving success. Teachers are aware of students' differences and are knowledgeable of evaluative processes. Highly qualified teachers utilize the data acquired from each student's assessment to inform instruction.

- Teachers know the subjects they teach and how to teach those subjects to students.

Teachers are expected to be an expert in the content area they are currently teaching. Additionally, highly qualified teachers should reflect on their practices and pedagogy to determine effective strategies for that content area. Highly qualified teachers should command an assortment of instructional approaches.

- Teachers are responsible for managing and monitoring student learning.

Teachers are facilitators of student learning. Highly qualified teachers engage students by providing relevant experiences and activities that focus on various learning styles and incorporate cooperative learning opportunities. Highly qualified teachers remain fixated on the objectives at hand.

- Teachers think systematically about their practice and learn from experience.

Highly qualified teachers must be able to think deeply about their practices and make decisions that are in the best interest of the students. Teachers should seek insight from other educators when faced with difficult decisions.

- Teachers are members of learning communities.

Highly qualified teachers continually read professional journals to gain insight into the latest research and appropriate practices. Teachers should affiliate with professional organizations that provide opportunities, which encourage teachers to grow and develop professionally.

The first three of the five core propositions integrate teacher quality and student achievement (NBPTS, 1994). Additionally, highly qualified teachers collaborate with colleagues to provide an optimum learning environment for students. In addition, teachers communicate and partner with parents frequently to determine the best instructional course for their children as well as to create a support network for students. Highly qualified teachers take advantage of resources that are available throughout the community.

NBPTS Certification Process

As of November 2004, NBPTS (2004) offered 24 areas of certification, including Early Childhood Generalist, Middle Childhood Generalist, Adolescence and Young Adulthood, and various other content areas. Candidates must hold a baccalaureate degree,

have taught for at least three years, and are required to have a state teaching license for those three years.

NBPTS (2004) was not created to dominate state certification systems, but as a supplement to them. NBPTS is a voluntary certification system for educators who wish to complete a thorough performance-based assessment process of their instructional practices. Candidates who are pursuing National Board Certification (NBC) complete a portfolio, which includes student work samples, videotapes of teaching, and written reflections of instruction and student learning. Additionally, candidates fulfill certification requirements through a timed computer-based assessment, which examines the candidate's depth of knowledge of the current teaching area. Most exercises evaluate the candidate's ability to reflect upon and apply their skills. In 1995, the first 86 teachers received NBC. In 2004, there were over 40,000 National Board Certified Teachers (NBCTs) nationwide and 2,377 NBCTs in Mississippi.

Highly Qualified Teachers

Shulman (1987) described highly qualified teachers as those who have the following attributes:

- Content knowledge;
- General pedagogical knowledge – with special reference to those broad principles and strategies of classroom organization that appear to transcend subject matter;
- Curriculum knowledge, with particular grasp of materials and programs that serve as 'tools of the trade' for teachers;

- Pedagogical content knowledge – that special amalgum of content and pedagogy that is uniquely province of teachers, their own special form of professional understanding;
- Knowledge of learners and their characteristics;
- Knowledge of educational contexts, ranging from the workings of the group or classroom, the governance and financing of school districts, to the character of communities and cultures; and
- Knowledge of educational ends, purposes, and values, and their philosophical and historical grounds. (p. 8)

All of the qualities of highly qualified teachers as defined by Shulman pinpoint the effect of the teacher on students' achievement.

On January 8, 2002, President George W. Bush signed the No Child Left Behind Act (NCLBA) (2002). The statement that precedes the law indicated that the purpose of the NCLBA is “to close the achievement gap” (p. 7) “. . .so that no child should be left behind” (p. 3). NCLBA proposes that every child will have an equal educational opportunity through high quality teachers and assessments. NCLBA stated that “preparing, training, and recruiting teachers is based upon the basic principle that teacher excellence is vital to achieving improvement in student achievement” (p. 12). The NCLBA proposed that every child in the US will be instructed by a highly qualified teacher by 2006. Teachers must demonstrate their proficiency in the content area they are currently teaching in order to be classified as highly qualified (Berry, 2002). The National Commission on Teaching and America’s Future (1996), proposed “an audacious

goal for America's future. Provide every student in America with what should be his or her educational birthright: access to competent, caring, qualified teaching" (p.10).

NBPTS candidates must verify that they are meeting the rigorous standards set by NBPTS, which are aligned with the NCLBA (NBPTS, n.d.b) within their classrooms so that students' learning will be increased as a result of having a highly accomplished teacher.

Goldhaber and Anthony (2003) attempted to define teacher quality through the use of standards created by three organizations: Interstate New Teacher Assessment and Support Consortium (INTASC), NBPTS, and the National Council for the Accreditation of Teacher Education (NCATE). The common strands for identifying highly qualified teachers:

- Understand the process through which children learn and develop, and be committed to furthering student learning.
- Have a deep knowledge of the subject they teach and be able to convey this knowledge to students in ways that engage student inquiry.
- Manage and monitor students' learning and reflect on teaching practices, making any needed adjustments to keep all students engaged in the learning process.
- Forge relationships with members of the broader educational community in order to foster students' learning. (p. 5)

Additionally, Goldhaber and Anthony stated that teachers are the most influential school factor predicting student achievement.

According to Rockoff (2003), even though there is limited empirical evidence to substantiate claims that teachers' credentials influence their students' achievement, teacher quality is considered paramount to students' attainment of content knowledge. Rockoff's study provided empirical evidence necessary to validate the claims that "raising teacher quality may be a key instrument in improving student outcomes" (p. 21). The Carnegie Task Force (1986) stated, "[T]he standards for entering teachers must be raised" (p. 35) in order to promote student success.

Although there are various definitions found in the literature for a highly qualified teacher, there are consistent characteristics which describe highly qualified teachers. Highly qualified teachers should be an expert in the content area they are currently teaching, positively impact student learning, and reflect upon instructional practices.

Research Related to NBCTs and Student Achievement

Bohen (2001) conducted 13 case studies of candidates who were seeking NBC. The purpose of the study was for candidates to voice their perspectives of how the certification process impacted their instruction. According to the candidates, their professional practice was strengthened through the continual process of reflection required during the NBC process. Teachers also believed that their assessment techniques were strengthened because they were required to provide justification for each activity and assessment that was reported in their portfolios. Additionally, teachers examined the activities and games they had previously utilized in class and determined that many were not providing engaging and necessary learning experiences for their students. According

to Bohen, NBCTs command a repertoire of advanced instructional strategies, which positively affect students' achievement.

Bond, Smith, Baker, and Hattie (2000), a researcher at the Center for Educational Research and Evaluation at the University of North Carolina at Greensboro, published the results of his study, which sought to determine if the process of NBC identifies high quality teachers. A sample of 65 teachers in North Carolina, Ohio, and Washington, D.C. who pursued NBC in Early Adolescence, English Language Arts, and Middle Childhood was used in this study. Bond, et al. collected demographic data for each participating teacher including race, sex, and years of teaching experience. Demographic data, including socioeconomic status, of the students were also collected. Of the 65 participating teachers, 31 achieved NBC. Data were collected from observations, scripted interviews, and teachers' lesson plans. Twenty-eight teachers who had previously received awards for demonstrating high quality instruction and had an average of 25 years of teaching experience were trained to observe in each of the participants' classrooms. As one observer examined the participants' lesson, another observer documented classroom interactions. After the lesson, the observers interviewed three randomly selected students from the participant's classroom. The observer questioned the students' understanding of the lesson. The observers also interviewed the teacher for approximately one hour. The participant was given questionnaires and a writing exercise for students to complete as well as directions on how to collect student work samples to send to the researchers for analysis. All data were collected and analyzed by a team of 22 NBCTs from North Carolina as well as Curriculum and Instruction doctoral students.

Each assessor reviewed a randomly assigned collection of data for each individual participant. Assessors scored the data for each participant from 1 to 4, with one being beginner teaching skills and behaviors and four being expert teaching skills and behaviors. Two assessors scored each participant's collection of data. NBCTs scored significantly higher on 11 of the 13 characteristics being measured (i.e., challenge, respect, use of knowledge). Students' work samples collected from 36 teachers were also analyzed to determine if the quality of their work correlated with the teachers' instructional quality. Some 74% of the students whose teachers who were NBC demonstrated a deep understanding of the lesson as compared to only 29% of students instructed by teachers who were non-NBCTs. According to the results of this study, all 65 teachers proficiently utilized instructional techniques. However, it must be noted that NBPTS partially funded this study. Funding was also received from the US Department of Education.

Stone (2002) conducted a study to determine the effects of NBCTs on students' achievement. Stone utilized teacher-effect scores, which "are reported on a scale of zero to 50. They represent the estimated mean achievement gains of the students taught by each teacher, in each subject taught by that teacher" (p.1). The teacher-effect scores of 16 NBCTs, who taught in Grades 3-8, were obtained from the Tennessee Value-Added System database. According to the Tennessee Value-Added Assessment System, teachers whose students demonstrate a 115% average growth annually in three core subjects are awarded a grade of "A" and receive a \$5,000 bonus, while those who show an 85% average growth annually are awarded an "F". Of the 16 NBCTs whose teacher-effect

scores were analyzed, none were eligible to receive the \$5,000 bonus. Stone refuted the NBPTS' perpetuation that NBCTs are considered highly qualified. The NBCTs in this study were considered to be similar to their colleagues in how their teaching affected the achievement of students.

Fuhrman (n.d.) was concerned about the lack of descriptors of participating teachers collected in Stone's study. Fuhrman provided possible demographic data that could have been considered in Stone's (2002) study as well as future studies, which include general demographic data, educational background, years of experience, type of National Board Certification and data received, how participating NBCTs compare to Tennessee's population of NBCTs, how participating NBCTs compare to candidates who did not achieve certification, and how participating NBCTs compare to other teachers in Tennessee, their school district, school, and current grade level.

Goldhaber and Anthony (2004) conducted a study to determine if the efficacy of teacher quality can be assessed. The researchers utilized existing data obtained from the North Carolina Department of Public Instruction. Third through fifth grade students' records were utilized since they were likely to have only one teacher in a self-contained classroom. The data consisted of 600,000 North Carolina third through fifth grades students' testing records for the years 1996-1997, 1997-1998, and 1998-1999. Student demographic data collected included race, sex, learning disabilities, English proficiency status, current grade, the number of students within their school, student/teacher ratio, percentage of minority students, percentage of students who received free or reduced lunch, and expenditure per student annually. Third through fifth grade teachers'

demographic data that were utilized included race, sex, age, area of licensure, degree (s) received, years of teaching experience, and their Praxis or National Teacher Exam scores. School demographic data collected were comprised of the district type (urban, suburban, or rural) and starting salary of teachers. Students were linked to their teachers for each of the years under investigation to track the students' progress. The scores of NBCTs' students' scores were compared to non-NBCTs' students' scores. According to the researchers,

A comparison of NBCTs to non-certified teachers is essential for policymakers wishing to use the NBPTS credential as a signal of teacher quality. This credential is actually cited in the federal *No Child Left Behind Act* as a prime example of the ways in which teachers can meet its 'highly qualified' requirement, and which many states are incorporating into their regulations as meeting this federal requirement. (p. 8)

The findings indicated that if a teacher is qualified in their current content area of instruction, more gains will be observed on students' achievement test scores. The results indicated that NBCTs are more effective than non-NBCTs, based upon student achievement as measured by students' achievement test scores. The study also concluded that students who were instructed by NBCTs received higher scores on the state's standardized test. It must be noted that this study was funded by the US Department of Education.

Vandevoort, Amrein-Beardsley, and Berliner (2004) utilized 14 Arizona school districts, specifically 35 elementary classrooms, to compare the academic performance of

students who were instructed by NBCTs to non-NBCTs. Four years of data (1999-2000, 2000-2001, 2001-2002, and 2002-2003) from the Stanford Achievement Test for third through sixth grade students were obtained from the Arizona Department of Education. Students' scores of NBCTs and non-NBCTs' were compared to determine the affect of certification on student achievement. According to the researchers, "What we did learn from this sample of NBCTs was quite similar to what was learned by Goldhaber and Anthony (2004). Board certified teachers have effects on students' achievement beyond that produced by non-Board certified teachers" (p. 36). It must be noted that this study was partially funded by NBPTS.

Various other validation studies are currently being conducted in many states. NBPTS or affiliates of the organization fund the majority of NBPTS studies. All but one of the studies mentioned above had results that favored NBCTs. However, results may be biased due to the association of the researcher to the NBPTS. As noted previously, few independent researchers have conducted studies related to NBPTS.

Theoretical Basis for Measuring Student Achievement using Standardized Tests

For many decades, the nation has been in turmoil over the issue of racial equality. A political debate regarding the effects of segregation on the educational opportunities for children of all races sparked an investigation led by Coleman, et al. (1966), who explored the predictors of student achievement through the social context of education. In the report entitled *Equality of Educational Opportunity*, Coleman, et al. concluded that student achievement can be attributed to: 49% parent involvement, 42% teacher quality, and 8% class size. Coleman, et al. paved the way for future research by indicating factors

they found to affect student achievement. Additionally, Coleman created the Center for Social Organization of Schools as an avenue to investigate scientific data (i.e., standardized test scores of children).

Sanders and Horn (1998) utilized the Tennessee data system that tracks teachers over time and links them to their students' achievement test scores. Sanders developed the Tennessee Value-Added Assessment system in which teachers are evaluated according to their effectiveness as measured by their students' achievement test scores in the Tennessee Comprehensive Assessment Program. Sanders and Horn utilized students' achievement test scores to evaluate teacher performance for the first time in the history of our nation's educational system.

Standardized test scores have been widely used to measure student achievement for several decades. However, there is an ongoing dispute as to whether or not standardized tests are the best measure of student achievement. Resnick (as cited in Stecher, Hamilton, & Naftel, 2005) asserted that, "Standardized achievement tests . . . have been the most common method for monitoring educational performance for decades" (p. 4). However, standardized tests are not without limitations. Conversely, standardized tests are considered the preeminent and most consistent method of evaluating students' progress through the curriculum.

Strengths of Measuring Student Achievement with Standardized Tests

Data collected from standardized test scores provide tangible evidence for an increase or decrease in student achievement. According to Rockoff (2003), "As measures of effective teaching, test scores are widely available, objective, and they are widely

recognized as important indicators of achievement by educators, policymakers, and the public” (p. 21).

McAdams (2002) provided insight into his perception of standardized tests. He communicated that although standardized tests are imperfect, they do incite educator accountability for student learning. McAdams indicated that teacher-made tests are flawed; however, they are still being used for assessment purposes. McAdams concluded that teachers can usually predict the students' results of the standardized tests due to in-class assessments of all content areas. Therefore, McAdams believed that standardized tests provide insight into students' progress within the classroom.

Hombo (2003) chronicled the history of the National Assessment of Educational Progress (NAEP), which illustrated the organization's commitment to providing rigorous, yet fair assessments. According to Hombo, NAEP's initial purpose was to assess what students have learned and if they are progressing over time. Over time, the NAEP indicated that the state assessments evaluate and compare states' scores on standardized tests. According to NAEP, the purpose of evaluating students' progress is to provide an indication of their attainment of particular learning goals and objectives and how students in the US are advancing compared to students in other competitive nations, so students' scores provide an indication as to how they are progressing throughout the curriculum.

Cicchinelli, Gaddy, Lefkowitz, and Miller (2003) provided insight into the four main aspects of the NCLBA, which is the most recent piece of legislation establishing accountability for school districts, schools, and ultimately teachers, parents, and students. NCLBA mandated annual testing of students in Grades 3-8 in the areas of reading and

mathematics. Additionally, NCLBA stated that by 2014, all students' minimal performance should be equivalent to the proficient level. Cicchinelli, et al. indicated that standardized tests do have flaws such as providing little evidence of a students' progress over time. However, researchers believe that standardized tests can be used to assist teachers in reflecting upon their practice and improving weak areas. Gordon (n.d.) suggested that annual standardized assessments mandated by the NCLBA provide a more in-depth evaluation of student achievement as well as a requirement that all students make some progress.

According to the RAND Institute on Education and Technology (2005), standardized tests scores have increased steadily over the past two decades. The data collected from students' standardized test scores provide educators and researchers insight into the progression of educational reform efforts. Although there was a slight decrease in students' achievement scores in the 1970s, the 1980s and early 1990s were marked with an overall increase in students' performance. Campbell, Hombo, and Mazzeo (2000) focused on the consistency of the NAEP's scores. For example, gains that were demonstrated in the 1980s and early 1990s remained constant through the 1990s.

Frontline (2005) provided positive remarks from testing advocates across the nation. For instance, supporters of standardized tests professed that testing is the most effective way to measure student achievement and whether teachers are instructing students based upon the mandated curriculum. Also, Frontline supported the NCLBA and stated that students' knowledge base is indicated in the results of standardized tests. This is the most proficient method of evaluating students' progress as well as making sure that

the achievement gap across the nation is closing. Standardized tests provide the most objective assessment of learning objectives. Teachers may assess students differently using a variety of measures, whereas standardized tests measure the same skills and are graded accurately from student to student.

The Spring 2005 edition of the *American Educational Research Journal* published Rumberger and Palardy's (2005) article related to high school students' achievement. This article focused on the relationship between test scores, dropout rates, transfer rates, and enrollment rates of high school students. The authors' focus was on standardized testing. Rumberger and Palardy stated that requisite standardized tests provide an accurate portrayal of what a student has learned, which is of utmost importance to school outcomes.

Researchers have cited various reasons for the necessity of using standardized tests to measure student achievement. Students' progress is measured and provides an accurate picture of whether students have attained the learning goals that are tested. Standardized test results inform policy decisions related to education. Standardized tests are used as a comparable measure of students in other advanced countries. Standardized tests seem to be controversial, but they are the most consistent method of testing that is currently available to test a large amount of students.

Limitations of Measuring Student Achievement with Standardized Tests

While there are many positive aspects of using standardized tests as a measure of student achievement, standardized tests do have limitations. According to Banicky and Foss (2000),

Assessment can provide important information, but while results can be used for many purposes (e.g., accountability, informing instruction, program evaluation), no single method can address all of these purposes well. Most state assessment systems are designed to improve instruction and to inform accountability decisions, but these two purposes are often at odds. Therefore, it is critical to be clear about the purpose of the assessment and the limitations of the methods used. (p. 1)

According to a Fact Sheet published on Blalock's (2000) website, standardized test scores do not provide an accurate account of students' knowledge because it is only one measure. Also, Blalock stated that standardized test scores are limited in scope. In order to paint a picture of the staunch opposition to standardized testing, Blalock concluded that using standardized test scores as a measure of students' knowledge is like using a photograph rather than a video. Blalock's perspective focused on the inadequate depiction of one moment of a student's learning captured by a standardized test. Rather, multiple assessment methods provide a global portrayal of students' learning.

Falch and Ronning (2004), Professors of Economics at the Norwegian University of Science and Technology, suggested that there are alternate methods of evaluating students' achievement. For example, teachers submit grades for students over the course of a school year and utilize various methods of assessment. Falch and Ronning argued that yearly grades provide a more accurate picture of students' progress.

Additionally, FairTest: The National Center for Fair and Open Testing's website (n.d.) published a fact sheet regarding the perceived problematic areas of standardized

tests. For instance, the website stated that students are expected to answer questions that require low level thinking skills (i.e., knowledge). Items on standardized tests do not incite reflective thinking. FairTest asserted that standardized tests are created for Caucasian, middle class students to succeed.

Standardized tests are not presumed to be completely reliable; if they were, the results would be replicated exactly for each administration. FairTest (n. d.) indicated that biases are included on standardized tests and can not be removed completely since some test creators do not consciously acknowledge their own biases. FairTest concluded that incorporating multiple assessment methods provides a more comprehensive picture of a student's academic achievement and progress.

The National Education Association (NEA) (n.d.) replied to the NCLBA's (2002) mandated national assessment. According to the NEA's website, high stakes, standardized tests limit the scope of the curriculum. Teachers are not motivated to teach important concepts. Instead, teachers are being forced to "teach to the test" due to the stringent requirements from the state benchmarks and national legislation. The NEA concurred with FairTest's perspective that utilizing various assessment methods depicts students' performance more globally. The NEA indicated that our nation is rushing students through the curriculum and placing too much emphasis on learning objectives that easily transfer to multiple choice test items.

Many argue that one moment in time, or one standardized test, is not an efficient method of collecting data related to student achievement (Blalock, 2000; Falch & Ronning, 2004). Teachers collect various forms of students' work throughout an entire

year; this is a more representative and comprehensive evaluation of students' achievement (Falch & Ronning, 2004).

McAdams (2002) concluded that, “standardized tests are not perfect measures of what . . . students have learned” (p. 1), but as “imperfect as they are, standardized tests do the job” (p. 2). He also stated that, standardized tests “enable policymakers and the public to answer much more confidently the question, ‘Are the children learning?’” (p. 2).

McAdams claimed, “assessment[s] are flawed, even seriously flawed. Nevertheless, I remain committed to the use of testing. . . to improve America’s public schools” (p. 1).

Although the use of standardized tests may be problematic, educators do not have another option to test students on a large scale and within the same parameters. Even though standardized tests may be flawed, they seem to be the best choice at the current time.

Predictors of Student Achievement

Researchers have focused on determining what school characteristics influence students' achievement. Word et al. (1990) conducted a study in Tennessee entitled Project Student Teacher Achievement Ratio (STAR), in which students were randomly assigned to reduced size classrooms. The purpose of the project was to experiment with reducing class size to determine if it would result in increased student achievement. The four-year study involved more than 7,000 students from 79 schools. Students were randomly assigned to three interventions: reduced class size, normal class size, and normal class size with a teacher's assistant. Teachers were randomly assigned to teach the classes. The project concluded that when class size was reduced, students' performance

on achievement tests increased. However, most of the gains were correlated with the first year in a reduced class, not the ensuing years.

Conversely, Berliner and Biddle (1995) provided a rebuttle to the report by Coleman, et al. (1966) *The Manufactured Crisis* which claimed that our nation had created an educational crisis. Berliner and Biddle (1995) indicated that Coleman's report was not founded in research or in the achievement test scores of children. According to Berliner and Biddle, parents are the single most important factor of a child's educational success.

According to numerous research studies, there is one factor in particular that increases student achievement more than any other school characteristic: the classroom teacher. Darling-Hammond (2000) conducted a study that utilized data from the National Assessment of Educational Progress, the "Nation's Report Card". The purpose of the study was to distinguish which teacher characteristic (such as teacher quality, teacher preparation, and teacher certification) or school characteristic (per pupil expenditure, pupil-teacher ratios, and reduced class size) overwhelmingly impacts student achievement. Darling-Hammond analyzed state-level achievement test scores and found that teachers certified in the content area in which they are currently teaching is the most influential predictor of student achievement.

Webster and Fisher (2001) conducted a study of 57 Australian schools, including 4,645 students and 620 teachers. Data were collected from a mathematics standardized test obtained from the Third International Mathematics and Science Study. Students' scores were calculated and then an estimate of their mathematics ability was produced.

Students also completed a survey composed of 10 items pertaining to their teacher's instructional practices. Students rated their teacher's instruction on a Likert-type scale. Webster and Fisher indicated that, according to the data, there are many characteristics that affect student achievement such as opportunities to learn, instructional strategies of the teacher, classroom environment, and social relationships among peers and the teacher. However, Webster and Fisher concluded that classroom teachers and their instructional practices are paramount in increasing student achievement.

Goldhaber (2002) incorporated the findings of many researchers including Hanushek, Kain, and Rivkin's study (as cited in Goldhaber). Hanushek et al. found that teacher quality accounted for 7.5% of variation in students' test scores, which was larger than any other school characteristic. Goldhaber reported findings from his study, a replication of the Hanushek et al. study. Goldhaber's replication study reported that teacher quality as measured by teacher degree and experience levels, subject-matter knowledge, and teacher pedagogical knowledge accounted for 8.5% of variation in students' test scores. Goldhaber's findings indicated a similarity between the two studies, validating the previous research. Goldhaber's recommendation is for school districts to invest in highly qualified teachers.

Hanushek, Kain, O'Brien, and Rivkin (2005) obtained demographic data from the Texas Schools Microdata Panel for teachers and students in Grades 4-8 for the following school years: 1995-1996 and 2000-2001. The purpose of their study was to use students' achievement test scores to determine the effect of certification on student achievement. Student level data were collected from the Texas achievement test, TAAS, which

assesses students' knowledge of all subject areas. Hanushek et al. reported that students' achievement test scores are more likely to increase if they have teachers who are highly qualified, or certified, in the content area in which they are currently teaching.

Numerous research studies have cited teachers as the prominent factor that affects student achievement. Teachers who are highly qualified in their current area of teaching more significantly impact students' achievement than teachers who hold an emergency certificate or are not qualified to teach in their current content area. Researchers continue the cyclical debate regarding what school factor is the most predictive of student achievement. Parents and their involvement in their child's education have been found to be an important factor of student achievement. Other researchers point to reduced class sizes as the overriding factor that predicts student achievement. However, most researchers who conduct this line of research concur that teachers are the single most important factor affecting student achievement and outcomes.

Review of the Literature Summary

Historically, educational reform is a recurring process in the US. Educators and policymakers are constantly trying to determine the most efficient method of increasing student achievement. Many researchers have provided empirical evidence that supports teachers as the most important factor that affects student achievement. NBPTS claims to identify teachers who are highly accomplished in a wide array of instructional techniques. Many research studies have verified that statement; however, many of those studies utilized funds from NBPTS. There is a debate regarding the use of standardized tests to evaluate student performance. Standardized tests do have flaws; however, utilizing

standardized tests to measure student achievement is the only consistent method being employed in the US currently.

Purpose of the Study

The purpose of this study was to analyze Mississippi Curriculum Test (MCT) scores of a random selection of students in Grades 3-5 in Mississippi school districts to determine if there is a statistically significant difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) and how those differences can be explained based upon selected teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and NBC). The teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and NBC) were selected as the units of analysis in this study due to the directory type nature of these data and based upon previous similar studies (Fuhrman, n. d.; Goldhaber & Anthony, 2004; Stone, 2002).

Research Questions

1. Is there a statistically significant difference between the MCT scores (reading, math, and language arts) of two groups of students (those taught by a NBCT and those who are not)?
2. How is the difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) explained based on selected teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and NBC)?

Justification of the Study

There is little empirical evidence that National Board Certified Teachers (NBCTs) and various teachers' characteristics are predictors of increased student achievement. However, the National Board for Professional Teaching Standards (NBPTS, 1994) claims to certify highly accomplished teachers, who impact student achievement. The NBPTS seeks to identify and

recognize teachers who effectively enhance student learning and demonstrate the high level of knowledge, skills, abilities and commitments reflected in the following five core propositions:

- Teachers are committed to students and their learning.
- Teachers know the subjects they teach and how to teach those subjects to students.
- Teachers are responsible for managing and monitoring student learning.
- Teachers think systematically about their practice and learn from experience.
- Teachers are members of learning communities. (pp. 3-4)

The NBPTS refers to students' learning in the first three of the five core propositions. This study sought to establish if there was a difference between the two groups of students' scores, and if a difference was found, this study also sought to identify how the difference was explained based on selected teacher demographic data. This study will also add to the state and national literature related to NBPTS. According to Goldhaber and Anthony (2004), "the available literature on NBPTS [National Board

for Professional Teaching Standards] has been striking in its absence of rigorous quantitative studies” (p. 6). This study sought to provide a quantitative basis for determining if there is a difference between the standardized test scores of students’ taught by NBCTs and those not taught by NBCTs, and how that difference could be explained based by teacher demographics.

Limitations

The National Board for Professional Teaching Standards (NBPTS) offers 24 areas of certification. This study only focused on the Middle Childhood Generalist and the Adolescence certificates. The findings are limited to these two certificate areas and are not generalizable to the remaining certificate areas.

This study was conducted in Mississippi. Therefore, the findings are specific to National Board Certified Teachers (NBCTs) and non-NBCTs in Mississippi.

Additionally, the researcher is a NBCT, and there are possible biases that could diminish the integrity of the study. However, the researcher has no preconceived notions regarding the quality of NBCTs or non-NBCTs regarding their level of instructional quality and efficacy. The researcher spent the majority of her instructional time in the classroom as a non-NBCT. The researcher sought certification during her last year of teaching in the elementary classroom and received notification of certification six months after pursuing endeavors beyond teaching in the elementary classroom. During five years of teaching in the elementary classroom, the researcher worked closely with teachers who were NBCTs as well as non-NBCTs, both of whom the researcher considered professional and proficient teachers.

This study focused on students in Grades 3-5. Many of these classrooms may be departmentalized, so the teacher of record may or may not teach all subjects to their students. Students may change classes to receive instruction on various subject areas from other teachers in that specific grade. This study does not take into consideration the other teachers that students may have encountered beyond the teacher of record.

CHAPTER II

METHODOLOGY

The chapter discusses the research design used in this study. Included are descriptions of the research design, sample, procedures, instrumentation, and data analysis.

The purpose of this study was to analyze Mississippi Curriculum Test (MCT) scores of a random selection of students in Grades 3-5 in Mississippi school districts to determine if there is a statistically significant difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) and how that difference can be explained based upon selected teachers' demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience and NBC). The findings of this study will add to the limited literature on the effectiveness of National Board Certification (NBC). Few studies have been conducted which were not funded by the National Board for Professional Teaching Standards (NBPTS). Also, Mississippi has not conducted a study of this nature related to NBC.

Research Design

This study utilized a causal-comparative design in an “attempt to determine the cause *or* consequences of differences that *already exist* between or among groups of individuals” (Fraenkel & Wallen, 2003, p. 368). According to Fraenkel and Wallen,

causal-comparative studies identify two groups with “at least one categorical variable (group membership)” (p. 370) in which “group performances (average scores)” (p. 370) are used (p. 370).

Existing data were obtained from the Mississippi Department of Education (MDE) (Appendix A). One group of students who was selected was taught by NBCTs. The other group of students was taught by non-NBCTs. Then, students’ MCT scores were analyzed in conjunction with teachers’ credentials and characteristics to assess the “significant differences among the groups” (Hair, Anderson, Tatham, & Black, 1998, p. 350). The mean test scores of the groups were analyzed to determine how the difference between the groups could be explained.

Selection and Description of the Sample

The MCT scores of students in Grades 3-5 were compiled by the Office of Research and Statistics at the Mississippi Department of Education (MDE) for the school years 2002-2003, 2003-2004, and 2004-2005. Upon receipt of these data, 50 students were randomly selected using the Statistical Package for the Social Sciences 13.0 (SPSS 13.0). The rationale for selecting 50 students over a three-year period (a total of 150 cases) was based on the number of independent variables in the model. For each independent variable, a minimum of 20 cases was selected. There are seven independent variables, so the sample of 150 exceeded the 140 cases that were necessary for the analysis. According to Hair, et al., (1998) the “recommended minimum cell size is 20 observations, although larger cell sizes may be required for acceptable statistical power” (p. 342). After 50 students were randomly selected, they were linked with their teachers

for each of the years under investigation through the teacher demographic data obtained from the Management Information Systems (MIS) Office at the MDE. Each student was coded for each year under examination.

This data coding process is referred to as the “Multilevel Model for Change” (Singer & Willett, 2003). The purpose of coding the data this way was to alleviate problems that may occur during the statistical analysis due to changes over a period of time. The “Multilevel Model for Change” provides insight into longitudinal data by coding the participants for each individual year, which decreases the amount of columns and increases the amount of rows (or cases) within the data file. For example, each student was coded for each year. Within those years, the dependent variable remained constant (MCT scores). However, those scores change from year to year. Each student’s score was entered alongside the corresponding year. In addition, the teachers’ demographic data (independent variables) changed over the three-year period. For instance, a teachers’ certification may change from non-NBCT to NBCT, the age may increase, and the highest degree received may change. All of these changes were accounted for when coding the variables for each year.

Teachers’ age and years of experience were coded as categorical data to comply with the requirements for running a MANOVA in which all independent variables must be categorical, while the dependent variables must be numerical in nature.

There were 150 teachers in the sample, one for each of the 50 students for each of the three years under investigation. The average teacher in the sample was 44 years old. Teachers’ ages ranged from 21 to 63. The average teacher in the sample had 14 years of

teaching experience. The range of years of experience expanded from zero years to 35 years (see Table 2.1). In comparison, the MDE indicated that the average Mississippi teacher is 43 years old with 13 years of experience.

Additionally, the sample of teachers consisted of 69.3% white teachers. The remaining teachers in the sample were black (see Table 2.1). No other race was indicated within this sample. According to the average teacher data for Mississippi, 73.9% of the Mississippi teaching population consists of white teachers, and 25.6% are black.

Additionally, the average teacher data for Mississippi included less than 1% Hispanic and Asian teachers. Teachers' demographic data are compared to Mississippi's demographic data to follow the precedent set by Fuhrman (n.d) when he refuted Stone's (2002) findings because of a lack of teacher demographic data and the assertion that future studies should contain a comparison between the sample of teachers and the state's teacher demographics. The teacher race data from this study are consistent with the Mississippi teacher population.

Out of 150 teachers, 83.3% were female (see Table 2.1). According to the MDE average Mississippi teacher data, 81.7% of Mississippi teachers are female. The sample for this study contains a larger group of female teachers and a smaller group of male teachers in comparison to the Mississippi average.

Moreover, 88.7% of teachers received a Bachelor's degree as the highest degree earned (see Table 2.1). Very few of the participants had earned graduate degrees, and none had received a doctoral degree. According to the MDE average teacher demographic data, 60.2% of all teachers have earned a Bachelor's degree, and the

remaining teachers have earned a higher degree. The sample for this study included teachers who have received varying levels of degrees.

According to the National Board for Professional Teaching Standards website (2005), there are currently 2,377 NBCTs in Mississippi. Across the nation, Mississippi ranks sixth among states with NBCTs. The majority (80%) of teachers in this study were not NBCTs, which is consistent with the status of NBCTs in Mississippi in comparison to those teachers who are not NBC. There are very few NBCTs in comparison to the population of teachers within the state.

Finally, the teachers in this sample teach in Grades 3-5. Of the teachers within this study, 40% had a Pre-Kindergarten through third grade licensure endorsement, and 54.7% of participants had a fourth through eighth grade endorsement. Over 85% of the participants had an endorsement in more than one area. For example, 51% of non-NBCTs have an endorsement in both Pre-kindergarten through third grade or fourth grade and an endorsement in Grades 4-8, and 40% of NBCTs have both endorsements as well. However, the majority of teachers in this study did not have an endorsement for a particular content area, such as Social Studies, Science, or English. A large number of teachers (9.4%) have a Music endorsement as opposed to a specific content area endorsement (see Table 2.1). The MDE average teacher demographic data identified 25.6% of teachers who have a Pre-kindergarten through third grade endorsement, and 42.3% of teachers had an endorsement in Grades 4-8. The No Child Left Behind Act (2001) proposed that every child in the US will be instructed by a highly qualified teacher by 2006, which refers to 21 course hours in one particular content area.

Table 2.1 Teacher Demographic Data Frequency Table by Group

Category	NBCTs	nonNBCTs	Total
Art Pre-K-12 Endorsement	0	2	2
Business Education 7-12 Endorsement	0	1	1
Driver's Education 7-12 Endorsement	0	1	1
1-9 Endorsement	3	6	9
Pre-K-3 Endorsement	15	45	60
English 7-12 Endorsement	2	2	4
Pre-K-4 Endorsement	0	21	21
Music K-12 Endorsement	4	10	14
Biology 7-12 Endorsement	0	3	3
General Science Endorsement 7-12	0	4	4
Social Studies 7-12	0	6	6
Mentally Retarded Pre-K-12 Endorsement	1	1	2
Learning Disabled Pre-K-12 Endorsement	0	2	2
4-8 Endorsement	14	69	83
Male	3	22	25
Female	27	98	125
Age 21-30	1	23	24
Age 31-40	6	23	29
Age 41-50	10	33	43
Age 51-60	12	39	51
Age 61-70	1	2	3
White	21	83	104
Black	9	37	46
Bachelor's Degree	26	107	133
Master's Degree	4	12	16
Specialist Degree	0	1	1
0-10 Years of Experience	11	59	70
11-20 Years of Experience	9	26	35
21-30 Years of Experience	10	30	40
31-40 Years of Experience	0	5	5
National Board Certified	30	120	150

Procedures

First, the researcher contacted (by telephone) the Office of Research and Statistics and the Management Information Systems (MIS) Office at the Mississippi Department of Education to determine their level of interest in participating in this study. Permission letters (see Appendix A) were signed by representatives at the Mississippi Department of Education (MDE) to provide students' Mississippi Curriculum test scores (from the Office of Research and Statistics) as well as teacher demographic data and a link between teacher data and student data in the form of Mississippi Student Information System (MSIS) numbers (from MIS Office).

In order to obtain students' MCT scores for the 2002-2003, 2003-2004, and 2004-2005, the researcher complied with Federal Education Rights and Privacy Act (FERPA) regulations. The researcher wrote a letter to the MDE that informed them of the purpose of the study and how the data would be handled as outlined in the FERPA regulations. These federal regulations were implemented to protect the identities of children who participate in educational research (see Mississippi State University Institutional Review Board approval in Appendix B). The regulations state that data which contain identifiers (i.e., names and social security numbers or MSIS numbers) can be utilized to improve instruction. Additionally, these data were used for predictive statistical tests. Data were sent through postal mail after the MDE letters of consent were received.

Once data were obtained from the MDE, the researcher randomly selected 50 students to participate in the analysis. MSIS numbers, which identify students, were

utilized to link the randomly selected students to their teachers for each of the years under investigation.

Once the random sample of students was linked to the teachers for each year, data were coded so that all identifiers were removed. Numerical labels were assigned to the teachers and students to maintain confidentiality. Demographic data were also assigned numerical codes so that the data could be analyzed statistically. All of the original data were destroyed so that the data could not be linked back to a specific teacher or student.

The MANOVA was utilized due to its capability to identify combined differences not easily found in univariate tests (Hair, et al., 1998). MANOVA also creates a new variable to examine the differences between the linear combination of the dependent variables. Finally, the data were compiled and analyzed using the Statistical Package for the Social Sciences (SPSS) 13.0. Upon completion of the project, the researcher destroyed all coded data to ensure confidentiality of all participants, as outlined in FERPA and the Mississippi State University Institutional Review Board regulations.

Instrumentation

The selected teacher demographic data included endorsement area of certification, sex, age, race, highest degree received, years of experience, and National Board Certification (NBC). Previous research (Fuhrman, n. d.; Goldhaber & Anthony, 2004; Stone, 2002) related to student achievement and NBC had focused on these main variables as factors that possibly effect student achievement, which is why these variables were chosen as the independent variables in this study.

The MCT was used as an indicator of third, fourth, and fifth grades students' progress in reading, mathematics, and language arts. The MCT is administered to students in Grades 2-8 at the end of each school year to assess their progress through the curriculum. Each content area has 45 multiple-choice questions and four open-ended questions (MDE, 2005) in which the students have an unlimited amount of time to complete.

In 2001, Mississippi administrators and 210 teachers convened to create standards that define the levels of progress that students achieve through the curriculum. The MCT was developed from the state benchmarks, which were the minimum requirements necessary to advance to the next grade level. The committee determined that four categories were appropriate (MDE, 2005).

When students perform at the minimal level, they have not demonstrated mastery of the skills required in the current grade level and are expected to receive instructional remediation. As defined by the MDE (2005),

Students at the Minimal level are below Basic and do not demonstrate mastery of the content knowledge and skills required for success at the next grade.

These students require additional instruction and remediation in the basic skills that are necessary for success at the grade tested. (p. 1)

According to the MDE (2005), "Students at the Basic level demonstrate partial mastery of the content area knowledge and skills required for success at the next grade. Remediation may be necessary for these students" (p. 1). Students who perform at the

basic level have demonstrated limited understanding of the skills required at the current grade level and may receive remediation.

Students who demonstrate a proficient understanding of skills are ready to move on to more difficult skills. The MDE (2005) defines Proficiency as demonstration of solid academic performance and mastery of the content area knowledge and skills required for success at the next grade. Students who perform at this level are well prepared to begin work on even more challenging material that is required at the next grade. (p. 1)

Students who demonstrate an Advanced, or formerly known as mastery, understanding have a firm understanding of the skills required for the current grade and will be successful in learning the skills required for the next grade level. According to the MDE (2005), “Students at the Advanced level consistently perform in a manner clearly beyond that required to be successful at the next grade” (p. 1).

The following categories are tested in the area of reading for each grade level: context clues, word structure, word patterns, vocabulary, main idea and details, and comprehension. The language portion of the test focuses on the following categories: capitalization and punctuation, spelling, sentence structure, and meaning. The mathematics test encompasses the following categories: patterns and algebraic thinking, data analysis and prediction, measurement, geometry, and number sense (MDE, 2005).

Data Analysis

The data obtained from the MDE's Office for Research and Statistics and MIS Office were compiled and analyzed using the SPSS 13.0. The researcher sought to answer the following research questions through the use of the Multiple Analysis of Variance (MANOVA) technique.

1. Is there a statistically significant difference between the MCT scores (reading, math, and language arts) of two groups of students (those taught by a NBCT and those who are not)? A MANOVA was used to determine if there was a statistically significant difference between the MCT scores of two groups of students. According to Hair, et al. (1998), "The unique aspect of MANOVA is that the variate optimally combines the multiple dependent measures into a single value that maximizes the differences across groups" (p.334). The multiple dependent measures in this study are the reading, math, and language arts MCT scores for 2002-2003, 2003-2004, and 2004-2005. According to Hair, et al., "MANOVA may detect combined differences not found in the univariate tests" (p. 339). Additionally, MANOVA "can provide insights into not only the nature and predictive power of the independent measures but also the interrelationships and differences seen in the set of dependent measures" (p. 341). Since there are three dependent measures in the analysis, MANOVA is capable of managing the computation better than a univariate analysis. Additionally, mean MCT scores (reading, math, and language arts) were calculated for each group of students to determine which group was more likely to achieve higher scores in each area tested.

2. How is the difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) explained based on selected teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and NBC)?

The following are the independent variables that were used in the model: endorsement area of certification, sex, age, race, highest degree received, years of experience, and National Board Certification status. Once a difference was established in the analysis of the first research questions, descriptive statistics were calculated to determine which group of teacher (NBCTs or non-NBCTs) and which age group of teachers produced increased MCT scores (reading, math, and language arts).

CHAPTER III

RESULTS

This chapter addresses the research questions to determine if there is a statistically significant difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) based on selected teacher demographic data. Further analyses were conducted to determine how the differences that were established by the first research question could be explained by the selected teacher demographic data.

The purpose of this study was to analyze Mississippi Curriculum Test (MCT) scores of a random selection of students in Grades 3-5 in Mississippi school districts to determine if there is a statistically significant difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) and how those differences could be explained based on selected teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and National Board Certification status).

Existing data were obtained from the Mississippi Department of Education (MDE) Management Information Systems (MIS) and the Office for Research and Statistics. Data were compiled from a sample of 50 students for three consecutive years: 2002-2003, 2003-2004, and 2004-2005 (N=150).

The following teacher demographic data were included as independent variables in the model: endorsement area of certification, sex, age, race, highest degree received, years of experience, and National Board Certification (NBC) status. The following students' MCT scores were included as dependent variables in the model: reading MCT scores, language arts MCT scores, and math MCT scores. A Multiple Analysis of Variance (MANOVA) was used to “assess the statistical significance of differences between groups” (Hair, et al., 1998, p. 333).

Descriptive Data of Participants

Student Scores

There were 50 students in the sample for this study. The students' mean reading, math, and language arts MCT scores were calculated for a three year period. The following table (Table 3.1) identifies the mean MCT scores for each area tested for the three year period. Additionally, Table 3.2 identifies the mean MCT scores for the two groups of students (those taught by NBCTs and those taught by non-NBCTs).

Table 3.1. Mean MCT Scores of Students

Mean Reading MCT Scores	Mean Language Arts MCT Scores	Mean Math MCT Scores
38.23	40.01	38.04

Table 3.2. Mean MCT Scores of Students Taught by NBCTs and non-NBCTs

National Board Certification Status of Teachers	Mean Reading MCT Scores	Mean Language Arts MCT Scores	Mean Math MCT Scores
NBCTs	39.13*	40.23*	38.03
non-NBCTs	37.32	39.79	38.05

*Largest mean MCT scores for each area tested

Teacher Demographics

There were 150 teachers included in the sample for this study. The average teacher in the sample was 44 years old, with 14 years of experience. Out of the 150 teachers, 69.3% were white. The majority of teachers within this sample were female (83.3%), had earned a Bachelor's degree as their highest degree (88.7%), and were not NBCTs (80%). Teacher demographic data are discussed in Research Question Two.

Assumptions of MANOVA

First, assumptions of MANOVA must be met before progressing to the MANOVA analysis. The first assumption is a check for normality.

The assumption of normality for multivariate is that the groups within the sample (students taught by NBCTs and students taught by non-NBCTs) are normal. The following figures check for normality of each of the dependent variables (MCT test scores) used in the analysis. Figure 1 in Appendix C identifies the normal curve within the reading MCT scores, which is consistent with the Probability Plot of reading MCT scores in Figure 2 in Appendix C. Figure 3 in Appendix C provides a view of the slightly negative skew in the distribution of language arts MCT scores. The Probability Plot in Figure 4 in Appendix C reveals a normal distribution of language arts MCT scores.

Figure 5 in Appendix C illustrates the normality of the math MCT scores, which is also demonstrated in the Probability Plot of math MCT scores (see Figure 6 in Appendix C). Ultimately, the dependent variables within the context of this study meet the assumption of normality.

The multivariate assumption of homogeneity “refers to the assumption that dependent variable(s) exhibit equal levels of variance across the range of predictor variables” (Hair, et al., 1998, p. 75). The assumption of homogeneity of variance was met since there is no statistically significant difference (.972, $p = .05$) observed among the dependent variables (see Table 1 in Appendix D). This is confirmed by Levene’s Test of Equality of Error Variances (see Table 2 in Appendix D), which reveals that there is no statistically significant difference among the dependent variables.

Analysis of Research Question One

The first research question was: Is there a statistically significant difference between the MCT scores (reading, math, and language arts) of two groups of students (those taught by a NBCT and those who are not)?

A Multiple Analysis of Variance (MANOVA) was utilized to determine if there was a statistically significant difference between the MCT scores (reading, math, and language arts) of two groups of students (those taught by a NBCT and those who are not). Teachers’ NBC status (certified or not) did provide a statistical significance of .006 ($p = .05$). Teachers’ NBC status contributes to the difference in the MCT test scores of students who are taught by NBCTs and those who are taught by non-NBCTs (see Teachers’ National Board Certification Status in Table 3.3)

Table 3.3. Teacher National Board Certification Status

Effect	Significance
Teachers' National Board Certification Status	*.006

*Significant at $p=.05$

Analysis of Research Question Two

The second research question was: How is the difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) explained based on selected teacher demographic data?

The MANOVA reveals that teachers' race was not found to be a statistically significant (.396) variable that contributed to the difference in the MCT test scores of the two groups. Teachers' sex was also not a contributing factor (.375). Additionally, teachers' highest degree received (.285) was determined to have no effect on the variance of students' MCT scores. Moreover, teachers' endorsement areas (.746) and years of experience (.260) produced no significant effect as variables that contributed to the difference in the MCT test scores of the two groups (see Table 3.4). Since there were more non-NBCTs in this sample, the cell size for NBCTs may not have provided enough statistical power to discern if there was a statistical significance. However, teachers' age was revealed to effect the differences among MCT scores (.008, $p = .05$) (see Table 3.4). However, there was no other significant interaction observed between the independent variables.

Teachers' age was found to provide a statistically significant difference in students' MCT test scores. Descriptive statistics determined which age group generated increased MCT scores within each area tested (reading, language arts, and math). Mean MCT scores were calculated for each age group of teachers (see Table 3.5). Teachers whose ages ranged from 41-50 have the largest mean MCT scores for each area tested. Teachers' ages were calculated by group (NBCT or non-NBCT) to determine if the age group 41-50 is largely composed of NBCTs or non-NBCTs. Of the 120 teachers within this sample who are non-NBCTs, 27.5% of them are between the ages of 41-50. However, of the 30 NBCTs in this sample, 33.3% of them are between the ages of 41-50. This age group of teachers mostly consists of NBCTs.

Table 3.4 Teacher Demographic Data

Teachers' Race	.396
Teachers' Sex	.375
Teachers' Degree	.285
Teachers' Endorsement Area	.746
Teachers' Age	*.008
Teachers' Years of Experience	.260

*Significant at $p=.05$

Table 3.5. Mean Scores of Students by Teachers' Age

Teachers' Age	Mean Reading MCT Scores	Mean Language Arts MCT Scores	Mean Math MCT Scores
21-30	39.83	40.75	39.21
31-40	34.55	37.10	35.14
41-50	40.24*	41.94*	39.79*
51-60	38.57	41.04	39.08
61-70	26.33	32.00	33.00

*Largest mean MCT scores for each area tested

After the mean MCT scores for each teacher age group were analyzed, a Scheffe post hoc test was used as a statistical basis for testing the mean differences between the MCT test scores and teachers' age groups. The Scheffe post hoc test was used because "it is the most conservative [post hoc test] with respect to Type I error" (Hair, Anderson, Tatham, & Black, 1998, p. 356). The results of the post hoc test indicate that the teacher age group 21-30 was significant at .070 ($p = .10$). Additionally, the 61-70 teacher age group was also significant at .070, and the 41-50 teacher age group was near significant at .11 (just above $p = .10$). Additionally, post hoc tests revealed that teachers' age had a significant affect on students' reading MCT scores (.014) and math MCT scores (.076).

Summary

In summary, students taught by NBCTs were more likely to have higher MCT scores in reading and language arts. Math MCT scores were very similar among students who are taught by NBCTs and those who taught by non-NBCTs. In the analysis of research question two, teachers' race, sex, highest degree received, endorsement areas of

certification, and years of experience produced no statistically significant difference between the MCT scores of students who were taught by NBCTs and non-NBCTs.

Teachers' age was found to provide a statistically significant difference in students' MCT test scores. Teachers whose ages ranged from 41-50, which mostly consisted of NBCTs, have the largest mean MCT scores for each area tested.

CHAPTER IV

DISCUSSION AND RECOMMENDATIONS

Educational reform is seemingly always on the minds of educators, researchers, and policymakers in the US. Researchers are continually trying to locate variables that result in increased student achievement. National Board Certification (NBC) is a voluntary certification system that claims to identify highly accomplished teachers. Some research has validated that claim, but there is still concern whether National Board Certified Teachers (NBCTs) produce increased student achievement. Despite controversy, standardized tests are the most consistent method to measure student achievement. Teachers' selected demographic data in this study are the units of analysis.

The purpose of this causal comparative study was to analyze Mississippi Curriculum Test (MCT) scores of a random selection of students in Grades 3-5 in Mississippi school districts to determine if there is a statistically significant difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not). MCT data were obtained from the Office of Research and Statistics, and the selected teacher demographic data were obtained from the Management Information Systems (MIS) Office at the MDE. A random selection of 50 students for the three year period and teacher demographic data were coded in SPSS 13.0 for analysis using Multiple Analysis of Variance (MANOVA). The data were analyzed by two groups of

teachers. NBCTs and non-NBCTs were separated to determine their individual impact on student achievement. The analysis determined that there was a statistically significant difference between the MCT scores of students taught by NBCTs and non-NBCTs. Mean MCT scores were calculated for each group of students, which identified that students who are taught by NBCTs are more likely to have higher MCT scores in reading and language arts. Additionally, teachers' age was revealed to affect the difference in the MCT scores of students who are taught by NBCTs and those who are not.

Discussion of the Results

The following research questions were addressed in this study:

1. Is there a statistically significant difference between the MCT scores (reading, math, and language arts) of two groups of students (those taught by a NBCT and those who are not)? The results from the analysis indicated that there is a statistically significant difference between the MCT scores of students taught by NBCTs and non-NBCTs. In fact, students who were taught by NBCTs had higher reading and language arts MCT scores than students taught by non-NBCTs.

The results of a study conducted by Goldhaber and Anthony (2004) indicated that NBCTs are more effective than non-NBCTs, based upon student achievement.

Additionally, students who were taught by NBCTs received higher overall scores on the state's standardized test. Within this study, NBC status of teachers was found to effect students' achievement, in the areas of reading and language arts. During this high stakes educational era, there is a push to leave no child behind. The results of this study are

consistent with previous studies (Bond, et al., 2000; Bohlen, 2001; Goldhaber & Anthony, 2003; Vandevort, et al., 2004), which state that teachers are an important factor that affecting student achievement.

2. How is the difference between the MCT scores of two groups of students (those taught by a NBCT and those who are not) explained based on selected teacher demographic data (endorsement area of certification, sex, age, race, highest degree received, years of experience, and NBC)? None of the independent variables (teacher demographic data) indicated a statistical significance except for teachers' age. Most of the NBCTs' ages ranged from 41-50. Students instructed by teachers who fall into this age range tend to perform higher on the reading, language arts, and math MCT than students taught by teachers from any other age range.

According to the work of Shulman (1987), expert teachers should display knowledge of: content, pedagogy, curriculum, pedagogical content, learners, educational environments and educational purposes. Of the 150 teachers within this study, 91.6% have an endorsement in both Pre-kindergarten through third or fourth grade and Grades 4-8. However, the majority of teachers did not have endorsements in English, Biology, General Science, Social Studies, or Math. The No Child Left Behind Act (NCLBA) of 2001 proposed that every child in the US will be taught by a highly qualified teacher by 2006. To be considered highly qualified in the state of Mississippi, a teacher must successfully complete 21 course hours in a specific content area to be awarded an endorsement area on their license. Many teachers within the context of this study may be teaching in a contained or departmentalized classroom. Those teaching in a

departmentalized classroom, that is teaching one subject repeatedly throughout the day, are most likely not highly qualified within that content area. This becomes problematic for not only school districts that must establish justification for teachers teaching in their particular content area but also for the students. The literature (Berry, 2002; Goldhaber & Anthony, 2003, National Commission on Teaching and America's Future, 1996, Rockoff, 2003, & Shulman, 1987) indicates that students who are taught by highly qualified teachers will achieve at a higher rate. Students who are not being taught by highly qualified teachers are at the risk of achieving less than is possible.

The research of many (Bohen, 2001, Bond, et al., 2000; & Vandervoort, et al., 2004) has linked highly qualified teachers to National Board Certification (NBC). For example, Bohem (2001) and Bond, et al. (2000) noted that NBCTs command a large repertoire of instructional strategies, which, affects the achievement of their students.

Teachers' age was also found to be an influential factor contributing to the difference of students' reading, language arts, and math test scores. The sample of teachers within this study ranged from 21 to 63 years of age. The results of this analysis indicated that students who are taught by teachers whose ages ranged from 41-50 performed higher on reading, language arts, and math standardized tests.

Recommendations for Future Research

The following are recommendations for future research based upon the findings of this study:

- This study is limited in the scope of Mississippi's population. This study focused primarily on white female teachers as the dominant participant. Future studies could focus on other teacher groups (such as male teachers and teachers from other races or cultures) within Mississippi to determine if the results remain consistent across all races, sexes, and cultures represented within the teacher population in Mississippi.
- This study focused on teachers and students in Grades 3-5. Future research could be conducted which replicates this study with various other grades to determine if the results of this study are consistent with findings related to other grade levels.
- This study focused on the Middle School and Adolescent NBPTS certificate areas. Future research could be conducted on other specific NBPTS certificates to determine if the results of this study are generalizable to other certificate areas.
- Research related to Mississippi's teachers (NBCTs and non-NBCTs) needs to be conducted to determine the similarities and differences among the various teaching strategies, styles, and techniques along with the test scores of these teachers' students to reveal which group (NBCT or non-NBCTs) is more effective in impacting the achievement of their students and why they are more effective.
- This study found a link between the largest group of NBCTs and the age range 41-50. Future research could be conducted to determine if there is a relationship between NBCTs and their age and how this affects student achievement.

Additionally, future research should focus on whether age is the contributing factor to increased student achievement or if teaching experience plays a role.

- MDE could utilize data from their exterior database to determine how student achievement increases or decreases and the factors that contribute to those increases and/or decreases.
- Local school systems should determine which teaching practices are effective in increasing student achievement.
- MDE could conduct research related to students taught by NBCTs for two or more years to determine the impact that those teachers have on student achievement, if any.
- Future research should be conducted to determine what type of training pre-service teachers are receiving in math pedagogy. Teacher preparation programs related specifically to math should be implemented to train teachers how to teach mathematics.
- Research of NBCTs who are working toward their 10 year renewal certification should be conducted to determine the effectiveness of NBCTs over time as measured by student achievement test scores.

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APPENDIX A
MDE PERMISSION



Mississippi Department of Education
Hank M. Bounds, Ph.D. · State Superintendent of Education

Office of Educational Accountability · Steve Williams
Steve Hebbler, Director · Office of Research and Statistics 601-359-6077 Fax: 601-359-6740

October 28, 2005

Dear Jeanne Holland,

The Mississippi Department of Education is willing to grant you disclosure to the data you requested regarding the existing Mississippi Curriculum Test records of participating students' for the following years: 2002-2003, 2003-2004, and 2004-2005. Since the existing data being collected contain student identifiers, the Federal Educational Rights and Privacy Act (FERPA) regulations must be followed during the collection and analysis of data to ensure confidentiality. In accordance with 34 CFR 99.31(a)(6), an exemption to these regulations is hereby granted to Jeanne Holland as the results of this study will be used in the intended improvement of instruction and as the information will be destroyed when no longer needed for the purposes for which the study was conducted.

The regulations state that the data must be coded so that the students' identities remain anonymous; none of the teachers or students will be personally identified within the context of this study. A predictive statistical test will be administered to determine if there is a relationship between National Board Certified Teachers and their students' achievement as measured by the Mississippi Curriculum Test. This predictive statistical test will also be administered to determine which teachers' characteristics and credentials predict increased student achievement. This letter grants you permission to use these data in your dissertation.

Thank you,

A handwritten signature in black ink, appearing to read "Steve Hebbler", written over a horizontal line.

Steve Hebbler
Mississippi Department of Education

"Quality Education for Every Child"

Central High School Building · 359 North West Street · P.O. Box 771 · Jackson, MS 39205-0771



Mississippi Department of Education

Hank M. Bounds, State Superintendent of Education

Management Information Systems • Derrick D. Lindsay, Director • 601-359-3487 • Fax: 601-359-2027

November 3, 2005

Jeanne Holland
Instructor of Elementary Education
Mississippi University for Women
1100 College Street W-Box 1637
Columbus, MS 39701
(601) 241-7771

Ms. Holland:

The Mississippi Department of Education (MDE) is willing to grant you disclosure to the data you requested regarding Grades 3-5 teacher demographic data (race, age, sex, highest degree received, years of experience, and concentration area of certification-endorsement area) for the following years: 2002-2003, 2003-2004, and 2004-2005 as well as a link from the teacher demographic data to the student Mississippi Curriculum Test scores (as obtained by the Office of Research and Statistics at the MDE). Since the existing data being collected contain student identifiers, the Federal Educational Rights and Privacy Act (FERPA) regulations must be followed during the collection and analysis of data to ensure confidentiality. In accordance with 34 CFR 99.31(a)(6), an exemption to these regulations is hereby granted to Jeanne Holland as the results of this study will be used in the intended improvement of instruction and as the information will be destroyed when no longer needed for the purposes for which the study was conducted.

The regulations state that the data must be coded so that the students' identities remain anonymous; none of the teachers or students will be personally identified within the context of this study. A predictive statistical test will be administered to determine if there is a relationship between National Board Certified Teachers and their students' achievement as measured by the Mississippi Curriculum Test. This predictive statistical test will also be administered to determine which teachers' characteristics and credentials predict increased student achievement. This letter grants you permission to use these data in your dissertation.

Sincerely,

Derrick D. Lindsay
Mississippi Department of Education

"Quality Education for Every Child"

Central High School Building • 359 North West Street • P.O. Box 771 • Jackson, MS 39205-0771

APPENDIX B

MSU IRB APPROVAL



July 29, 2005

Jeanne Holland
Curriculum & Instruction
Mailstop 9705

Re: IRB Docket #05-181: Student Achievement and Teacher Certification: A Longitudinal Study

Dear Jeanne:

The above referenced project was reviewed and approved with one contingency. **The contingency for approval is receipt of the permission letters with FERPA exemption language from each participating school district and the Mississippi Department of Education. These letters must be on file with the IRB prior to any human subjects research.**

This study was reviewed via expedited review and approved for a period of July 29, 2005 through July 15, 2006 in accordance with 45 CFR 46.110 #7. Please note the expiration date for approval of this project is July 15, 2006. If additional time is needed to complete the project, you will need to submit a Continuing Review Request form 30 days prior to the date of expiration. Any modifications made to this project must be submitted for approval prior to implementation. Forms for both Continuing Review and Modifications are located on our website at <http://www.msstate.edu/dept/compliance>.

Any failure to adhere to the approved protocol could result in suspension or termination of your project. Please note that the IRB reserves the right, at anytime, to observe you and any associated researchers as they conduct the project and audit research records associated with this project.

Please refer to your docket number (#05-181) when contacting our office regarding this project.

We wish you the very best of luck in your research and look forward to working with you again. If you have questions or concerns, please contact me at 325-3294 or at tarwood@research.msstate.edu.

Sincerely,

A handwritten signature in cursive script that reads "Tracy S. Arwood".

Tracy S. Arwood
Director

cc: Dwight Hare

Office of Regulatory Compliance

P. O. Box 6223 • 8A Morgan Street • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3294 • FAX (662) 325-8776



November 7, 2005

Jeanne Holland
Mississippi University for Women
1100 College Street W-Box 1637
Columbus, MS 39701

Re: IRB Docket #05-181 – Student Achievement and Teacher Certification: A
Longitudinal Study

Dear Jeanne:

Our office has received the items listed as contingencies on your IRB approval. They are complete and you may proceed with your project.

Thank you for your cooperation and good luck to you in conducting this research project. If you have questions or concerns, please contact me at 325-3294 or at jmiller@research.msstate.edu.

Sincerely,

A handwritten signature in black ink that reads "Jonathan E. Miller".

Jonathan E. Miller
Compliance Administrator

Cc: Dwight Hare
File

Office of Regulatory Compliance

P. O. Box 6223 • 8A Morgan Street • Mailstop 9563 • Mississippi State, MS 39762 • (662) 325-3294 • FAX (662) 325-8776

APPENDIX C

FIGURES

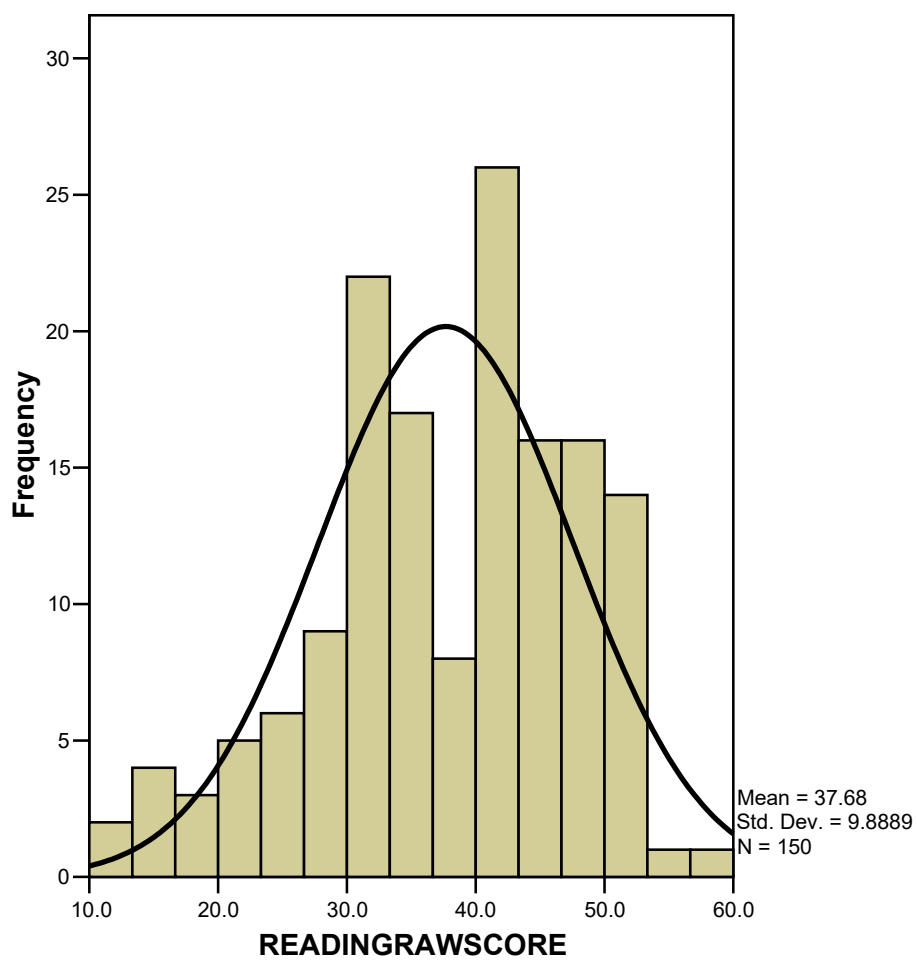


Figure C1. Reading Scores Histogram

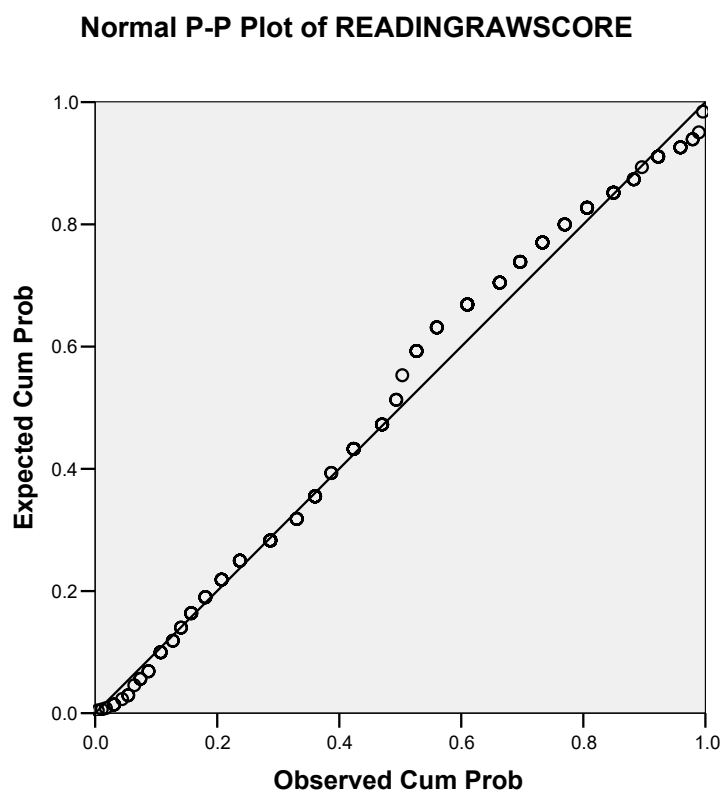


Figure C2. Normal Probability Plot of Reading Scores

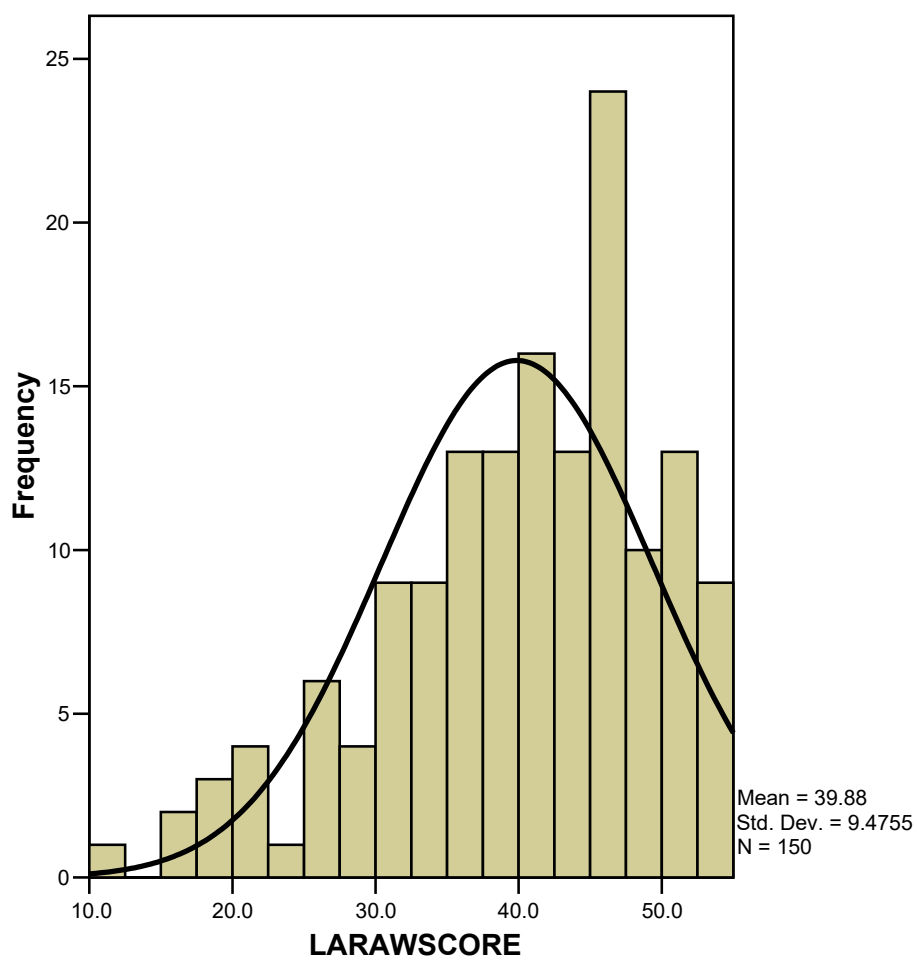


Figure C3. Language Arts Scores Histogram

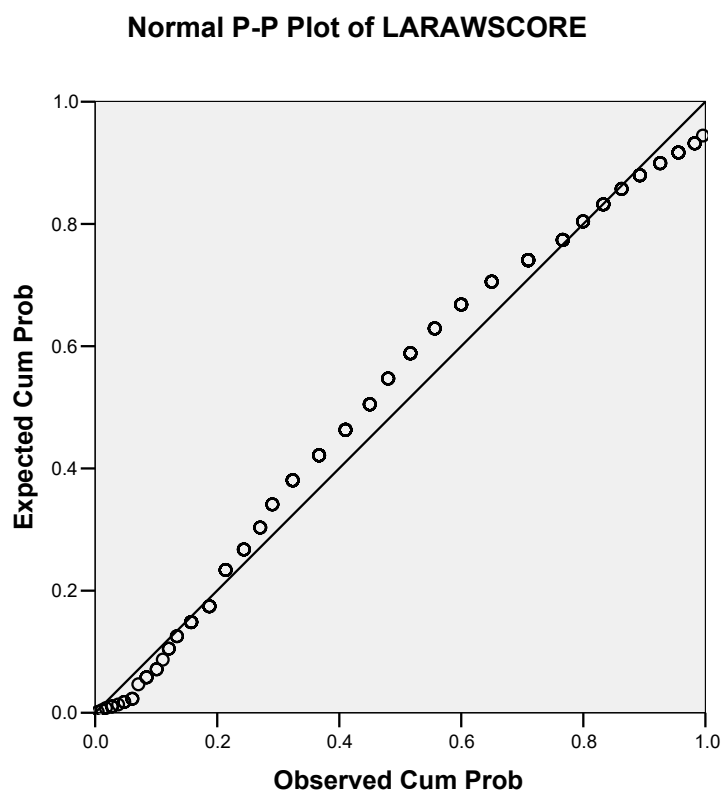


Figure C4. Normal Probability Plot of Language Arts Scores

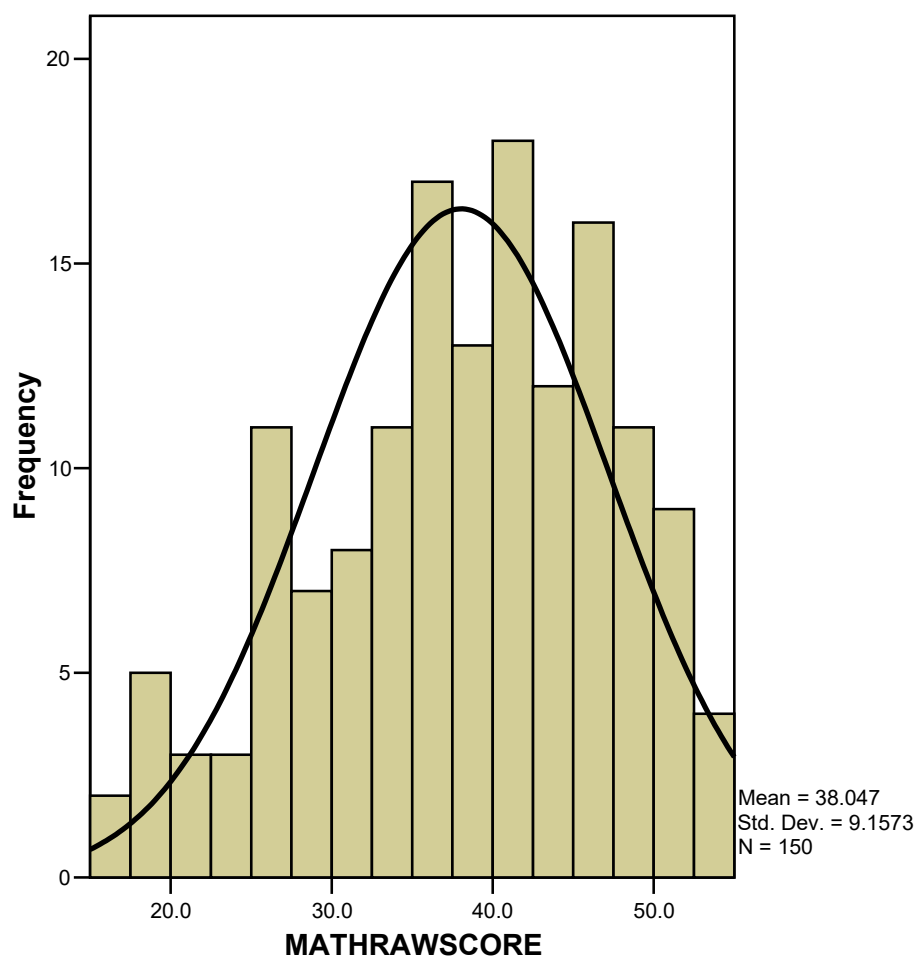


Figure C5. Math Scores Histogram

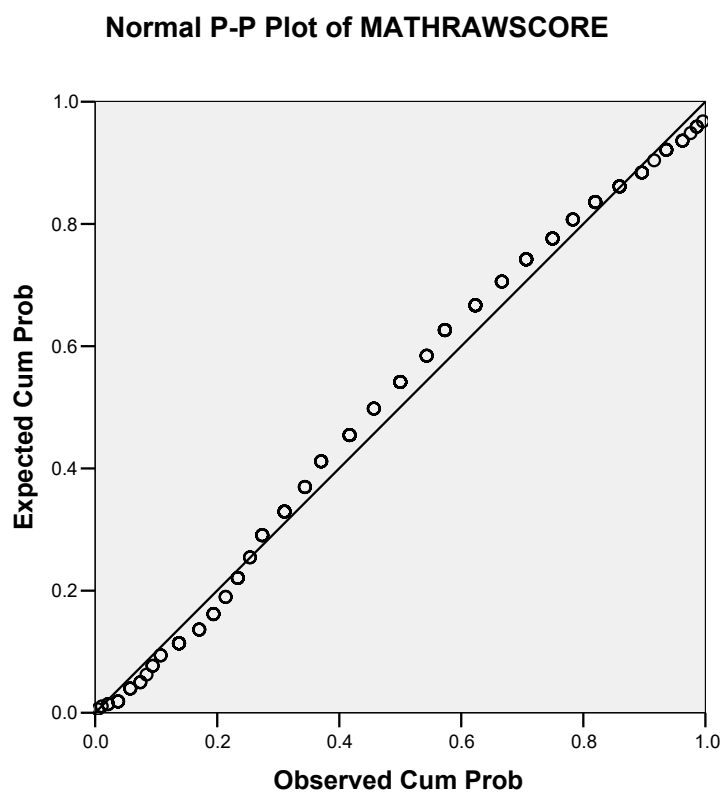


Figure C6. Normal Probability Plot of Math Scores

APPENDIX D

TABLES

Table D1. Box's Test of Equality of Covariance Matrices

Box's	
M	1.338
F	.214
df1	6
df2	16279.3
	.06
Sig.	.972

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a Design: Intercept+TNBPTS

Table D2. Levene's Test of Equality of Error Variances

	F	df1	df2	Sig.
Reading Scores	.135	1	148	.714
Language Arts Scores	.042	1	148	.837
Math Scores	.061	1	148	.806

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+TNBPTS