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The Relationship of National Board and Non-National Board Certified Teacher  
Growth Indexes on Standardized Assessments: A Causal Comparative Study

By  
Pamela D. Porter

A Dissertation Submitted to the  
Gardner-Webb University School of Education  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Education

Gardner-Webb University  
2018

## Approval Page

This dissertation was submitted by Pamela D. Porter under the direction of the persons listed below. It was submitted to the Gardner-Webb University School of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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The writing of this dissertation was supported through family and friends. They provided continuous encouragement and prayers which has assisted in the achievement of this goal.

## **Dedication**

I am blessed and fortunate to have the unconditional support from my mother, DeLois S. Linder, and daughter, Prea D. Porter, who helped me along the way. My mother has always endorsed my professional growth as an individual. My daughter's prayer and desire was for the completion of this study. So, I dedicate this study to my mother, DeLois S. Linder, my daughter, Prea D. Porter, and father, Willie Porter, who passed away on November 4, 1992.

## Abstract

The Relationship of National Board and Non-National Board Certified Teacher Growth Indexes on Standardized Assessments: A Causal Comparative Study. Porter, Pamela D., 2018: Dissertation, Gardner-Webb University, National Board Certification/ Growth Indexes/Standardized Assessment

The recent demand for schools to respond to accountability measures challenges teachers to increase their proficiency in the classroom in order to develop the unmastered skills of individual students as well as the whole class. There have been several attempts made to establish whether there is a relationship between student growth and teacher National Board Certification; however, opponents argue that National Board Certification may not be an accurate indicator of teacher growth.

The intent of this research was to compare National Board Certified (NBC) and non-NBC teacher mean growth indexes from the Education Value-Added Assessment System (EVAAS). The study explored EVAAS data in a large, urban North Carolina county to evaluate mean growth indexes in Grades 3, 4, and 5 in the subject areas of reading and math. Archival data were collected during the 2015-2016 academic school year. The purpose of this study was to investigate the impact that NBC teachers have on North Carolina End-of-Grade reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS.

This quantitative causal comparative study examined archival data from EVAAS and a group of 89 core elementary teachers from the district. The 89 core elementary teachers were disaggregated into three samples: overall, Title I, and non-Title I schools. The 89 core elementary teachers were grouped by teacher years of experience. Statistical Package for the Social Sciences (SPSS) was used to analyze teacher mean growth indexes. The independent sample *t* test Levene's Test for Equality of Variance was used to assess if there was a significant difference between students being taught by NBC and non-NBC teachers. The effect sizes from Levene's Test for Equality of Variance were interpreted using Cohen *d*. Results from the overall, Title I, and non-Title I samples indicated there was no significant difference in teacher reading mean growth indexes in Grades 3-5; however, the data indicated higher reading growth-index scores between students being taught by NBC teachers and non-NBC teachers. The reading finding indicated no significant differences between NBC and non-NBC teachers with teaching experiences of 11-20 and 21-30 years. Results from the overall, Title I, and non-Title I samples indicated there was no significant difference in teacher math mean growth indexes in Grade 4. Math results were mixed; in Grade 5, data indicated a significant difference in overall and Title I samples. The math findings showed no significant difference in the Title I and non-Title I samples of the 11-20 years of experience; however, the overall sample showed a significant difference with the 11-20 years of teaching experience. Data presented showed no teacher mean growth-index scores for Grade 3 even though there were 12 NBC teachers in the overall sample.

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## **Chapter 1: Introduction**

National Board Certification was designed to develop, retain, and recognize accomplished teachers as well as to generate ongoing improvement in schools nationwide (National Board for Professional Teaching Standards [NBPTS], 2017). Accountability measures outlined in state and federal mandates, including the No Child Left Behind Act (NCLB) of 2001, have placed greater pressure on schools wanting to raise student achievement. Teachers who are certified through the National Board process are expected to be able to “think systematically about their practice and learn from experience” (Hall, 2012, p. 115) and “commit to students and their learning” (Hall, 2012, p. 113). As a result, there is a heightened expectation for higher achievement rates in student achievement. Lustick conducted a study and found that National Board Certified (NBC) teachers had a greater ability to use data to drive instruction, progress monitor student achievement using multiple data sources, and reflect on their shortcomings (Hunzicker, 2011).

National Board Certification is the highest credential in the teaching profession, and participation is voluntary (North Carolina Department of Public Instruction [NCDPI], 2016). “Supporters believe certification legitimizes the hard work of teachers and acknowledges the complexities of the teaching profession” (Petty, Good, & Handler, 2016, p. 3). As educators face increasing pressure from federal, state, and local accountability policies to improve student achievement, the use of data has become more central to how educators evaluate their practices and monitor student academic progress (Knapp, Swinnerton, Copland, & Monpas-Huber, 2006). NCLB (2001) defined the highly qualified status for classroom teachers (Schultz, 2014). According to NCLB (2001), districts and schools are accountable for student achievement. Such

accountability can be ensured by requiring that teachers in public schools across the country demonstrate subject matter mastery at a particular grade level based on university coursework or successful passing scores on a state-based teacher examination.

According to NCLB (2002), states are required to ensure that poor and minority children are not taught at higher rates than other children by inexperienced, unqualified, or out-of-field teachers.

The development of student assessments and accountability programs and the use of associate data systems have recently emerged as central strategies for improving the nation's public schools (Carlson, Borman, & Robinson, 2011). As a result, more emphasis has been placed on teacher effectiveness as a means of supporting student achievement so that continuous efforts towards improvement are made. While teacher effectiveness has not been clearly defined, it is suggested that such effectiveness can be assessed through student achievement (Schultz, 2014), with the literature suggesting teachers are the most important influence on student learning in the school environment. The National Board Certification standards require teachers to collect, analyze, and use data to drive instruction. The ability to use data increases a teacher's effectiveness, which translates to an increase in student learning opportunities (Faria, Greenberg, Meakin, Bichay, & Heppen, 2014; Niemeyer et al., 2016); therefore, this should be an incentive for school districts to support teachers in the National Board process.

### **Background of the Problem**

NBPTS was established in 1987 through a grant from the Carnegie Corporation of New York as a means of defining, assessing, and recognizing accomplished teaching (National Conference of State Legislatures, 2011). Despite emphasis on improving teacher quality and support for advance certification status, there has been no statistically

significant evidence found that suggests high degrees of differences when comparing the test scores of students assigned to NBC teachers and those assigned to teachers who are not certified through the National Board process (Belson, Husted, & Thomas, 2015).

### **Statement of the Problem**

The problem for this study is the state of North Carolina provides an incentive of 12% pay increase for holding a National Board Certification even though there is minimal, disaggregated data on the impact NBC teachers have on student achievement in Title I schools. Research has addressed a relationship regarding teacher effectiveness but has not consistently identified a positive correlation between National Board Teacher Certification and student achievement. In fact, past studies have suggested mixed results when looking at whether National Board Certification actually improves teacher practice, professional development, and other facets of school improvement that are presumed essential to elevating student achievement (Croffordt, Pedersen, & Garn, 2011).

### **Purpose of the Study**

The purpose of this study was to investigate the impact that NBC teachers have on North Carolina End-of-Grade (EOG) reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District, a pseudonym for the actual district, as reported in the Education Value-Added Assessment System (EVAAS). Darling-Hammond (2000) examined quantitative data, finding that teacher preparation and certification variables strongly correlated to higher student achievement in reading and mathematics, more so than any other variables. National Board Certification has long been considered a valuable standard for measuring teacher effectiveness (Knoeppel, 2008). The recent demand for schools to respond to accountability measures challenges teachers to increase their proficiency in the classroom

in order to develop the unmastered skills of individual students as well as the whole class.

The National Board Certification standards suggest that student-based artifacts represent the best evidence of effective teaching (McMillian, 2015). Attempts to correlate student achievement with teacher National Board Certification have been questioned as there is evidence that National Board Certification may not be an accurate indicator of teacher effectiveness. The purpose of this study was to investigate the impact that NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. According to studies conducted by Goldhaber and Anthony (2007) and Cowan and Goldhaber (2016), there was a significant but small gain (0.5) in student achievement scores in math and reading for teachers with National Board Certification.

Several data sources were used to collect and analyze data for this study, including teacher EVAAS data from the 2015-2016 academic school year period and student EOG results from both the NBC and non-NBC participants. Information from each source was used to examine the effectiveness of NBC teachers on student achievement on the EOG test in Title I schools in selected elementary schools in ABC School District located in central North Carolina.

### **Significance of the Study**

District and state data seem to indicate a disparity regarding the impact of advanced teacher certifications, namely NBPTS, on student achievement. NBPTS are used by many states to determine teacher effectiveness in the classroom. North Carolina is the state with the highest number of NBC teachers in the nation, yet student achievement results suggest student performances are not influenced by the National

Board Certification of these teachers (Cavalluzzo, Barrow, Henderson, Mokher, & Sartain, 2014). Through this study, archival data were collected from NBC teachers and non-NBC teachers at the elementary Title I schools at the ABC School District. Data results were analyzed to determine whether National Board Certification is a key factor in teacher impact on student achievement. Results of this study will be shared with the local school district in an effort to inform future discussions and decision-making about teacher performance measures, student achievement, and the impact of National Board Certification.

Student learning is the focal point when questions arise about the effectiveness of National Board Certification; results from the majority of study findings indicated negative results when larger sample sizes were used (Flanagan et al., 2008). With so much emphasis placed on student performance and accountability, there are questions lingering about the best methods of assessing teacher effectiveness in the classroom (Byrd & Rasberry, 2011). Although results from research studies have been inconsistent when it comes to the effectiveness of teachers who have National Board Certification, current research suggests an increase in student achievement when teachers hold National Board Certification.

Knoeppel (2008) conducted similar research looking at the “significant mean differences for measures of student achievement between schools with a higher percentage of National Board Certified teachers after controlling for student demographics and other measures of teacher quality” (p. 14). A total of six groups were created for this study. According to Knoeppel’s research, there was a positive correlation in student achievement based on the percentage of teachers holding National Board Certification. Group 1 contained schools with 0-2% of teachers holding National Board

Certification (n=39), group 2 contained schools with 2-4% of teachers holding National Board Certification (n=152), group 3 contained schools with between 4-6% of teachers holding National Board Certification (n=65), group 4 contained schools with between 6-8% of teachers holding National Board Certification (n=39), group 5 contained schools with between 8-10% of holding National Board Certification(n=28), and group 6 contained schools with greater than 10% of teachers holding National Board Certification (n=36). NBC teachers increased student achievement by at least 2%. Achievement scores were significantly increased based on the number of NBC teachers in the school. Based on these findings, Knoepfel suggested that schools benefited when 4-6% or more of its teachers held National Board Certification, improving instruction and increasing student achievement. With current research beginning to show positive effects that support Knoepfel's findings, the National Board Certification process, with its five core components of performance, could potentially offer a valid means for assessing teacher performance in the classroom and increasing student achievement levels.

### **Research Questions**

Knoepfel's (2008) study focused on significant differences in student performance when schools had a higher percentage of NBC teachers. Knoepfel's research was used as a foundation for this research study; however, the focus of this study selected Title I and non-Title I elementary schools in a central North Carolina district. The following research questions were used to guide this study and determined whether teachers with National Board Certification can effectively improve instruction and increase student achievement in Title I schools in an urban North Carolina district.

1. For students in Grades 3-5 in Title I schools, what was the relationship of teacher reading growth indexes between students taught by NBC teachers and



students taught by teachers who were not NBC as measured by North Carolina EOG reading tests?

2. For students in Grades 3-5 in Title I schools, what was the relationship of teacher math growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG math tests?

### **National Board Certification**

The National Board Certification process can vary in length, taking several years to complete (What Works Clearinghouse, 2009). Candidates are required to have taught for at least 3 years in order to start the application process. Each teacher candidate is required to submit responses to essay questions in addition to the development of a teaching portfolio demonstrating knowledge of instructional pedagogy. Each component is then scored to determine whether the candidate has proficiently met each required standard (Liquanti & Peterson, 2002), and unsuccessful applicants are allowed to either resubmit the portfolio or essay responses if necessary.

According to Cavalluzzo (2004), school districts across the country offer various forms of financial incentives to teachers who successfully complete the National Board Certification process. Support for National Board Certification has increased over the past decade, as has the number of applicants interested in gaining the prestige of achieving national recognition for teacher excellence. In addition, many states encourage teachers to pursue National Board Certification by “offering to pay application and assessment fees” (Blazer, 2010, p. 3).

North Carolina continues to lead the nation with 20,677 teachers in the state achieving National Board Certification to date. Other states that experienced the largest

growth in their ranks of NBC teachers were Wyoming (16%), Washington (13%), and Hawaii (12%). Each of these states benefits from strong systems of peer support and mentoring for candidates, state and district incentives for certification, and recognition of the importance of National Board Certification from union leaders to state legislators.

There have been studies that found students taught by NBC teachers had scores that were statistically significantly higher (Cavalluzzo, 2004). For example, six NBC teachers in an elementary school in Illinois were asked to create professional development for their colleagues in reading and math. Students in Grades 3 and 4 scored significantly higher when compared to overall state averages on the Illinois Standards Achievement Test; however, sample sizes for most studies used were too small to generalize the results (Belson et al., 2015). As purported by the website for NBPTS (2017), National Board Certification has become synonymous with a higher order of teaching, yet there have been mixed results from research studies about whether student achievement is directly impacted by a teacher who has attained National Board Certification status (Cavalluzzo et al., 2014). A study conducted by Goldhaber and Anthony (2004) found that students of NBC teachers significantly outperformed students being taught by non-NBC teacher counterparts when looking at pre and poststudent achievement data. The impact of National Board Certification on student achievement can be measured based on evidence of student gains on achievement assessments and by teachers changing their instructional practices pedagogically, “which in turn affect students’ learning” (Petty et al., 2016, p. 4). A later study from Goldhaber and Anthony (2007) explained that education research has failed to reach a consensus over which, if any, readily identifiable teacher characteristics are associated with student learning gains.

## NBPTS

National Board Certification, or as it is formally known, NBPTS, allows teachers an opportunity to be recognized as master teachers through national-level certification. This certification not only identifies successful participants as being highly qualified in the teaching profession, it is used to enhance teachers' already existing state-issued licenses. National Board Certification is designed to be a challenging program that includes the use of videotaped classes and written responses in an assessment process (Viviano, 2012) that allows a teacher's instructional practice to be measured accordingly.

National Board Certification is offered in 16 different areas from which teachers can choose that align with their area of content and licensure. In addition, five core propositions for teaching have been outlined within the context of the certification process (NBPTS, 2016). The hallmark of the five propositions is that teachers who have demonstrated proficiency in the classroom have established a commitment to finding ways to increase student achievement. According to Petty et al. (2016), Proposition 1 recognizes that teachers should be committed to student learning; Proposition 2 requires teachers to know the subject area in which they are teaching and have advanced knowledge about the most effective methods for teaching those subjects; Proposition 3 directs teachers to take responsibility as facilitators of what their students learn in the classroom environment; Proposition 4 encourages teachers to critically think about their roles in the classroom and reflect on their experiences; Proposition 5 advises that teachers should be actively involved in professional learning communities.

Of the five propositions, three are related directly to student achievement and align with mandates found in major school reform and NCLB. NBPTS engages only the most rigorous standards for identifying exceptional classroom teachers; as a result, these

teachers are held to a higher standard. They are expected to have an exceptional ability to create successful student learning experiences, and student assessment data should demonstrate this exceptionality. Hence, students who are taught by NBPTS teachers are expected to achieve academic gains that exceed those of students who are taught by teachers who are not NBPTS certified (Education Consumers ClearingHouse, 2005).

In an effort to assess teacher effectiveness and as a component outlined in the propositions for National Board, increased emphasis has been placed on assessment of student learning within the classroom. Assessment plays an integral role in helping teachers to identify subject-area domains in which students need intensive intervention (Ciullo, SoRelle, Kim, Seo, & Bryant, 2011). Research has shown that data-driven reform initiatives cause statistically significant district-wide improvements in student achievement (Carlson et al., 2011) as well as teacher practices within the classroom. Teachers who have reached the distinguished status of NBC should be able to proficiently gather, analyze, and use student data (Viviano, 2012) to raise achievement in the subject areas in which they teach. Proficiency in the use of data should be developed so as to inform the instructional practices of the classroom (Means, Che, DeBarger, & Padilla, 2011). In addition, teachers are to conduct regular assessments to monitor progress and highlight weaknesses in core academic subjects. These assessment results must be reported in the aggregate as well as disaggregated according to individual subgroups of students (i.e., low income, or disability status, race, or ethnicity). New federal and state mandates have forced public schools across the United States to use data to measure student mastery of content standards. Fuchs, Fuchs, Hamlett, Phillips, and Bentz (1994) pointed out that teachers who use student test performance to guide and improve their teaching are more effective than teachers who do not use such information.

Given the importance of assessment, it stands to reason that NBC teachers who are said to possess expertise in this area are more likely better able to produce students who demonstrate skill mastery in their testing results.

Research-based strategies and personalized instruction are paving the way to higher test scores one student at a time (Gamble-Risley, 2006), allowing for differentiation for all students. “Differentiated instruction consistently yielded positive results” (Huebner, 2010, para. 4). Teachers who pursue National Board Certification are not only building a foundation for effective teaching, they are also influencing student learning. In theory, not only is National Board Certification supposed to change the classroom environment, it should also change the way teachers think about the delivery of instruction.

### **Incentives for Board Certification**

Twenty-three states currently encourage teachers to become board certified by providing assistance with application fees or financial incentives for achieving certification. The state of Mississippi offers a \$6,000 annual salary increase for the life of certification, and North Carolina offers a salary 12% higher than base for the life of the certificate. Colorado, Maryland, Washington, and Wisconsin offer additional salary to board certified teachers who work in low-performing schools as a way to attract accomplished teachers where they are needed most. North Carolina now leads the nation in the number of NBPTS teachers; this support clearly worked to motivate teachers to pursue this credential (Appendix A--reading and Appendix B--math). Most states allow teachers to use board certification to achieve the highest or mastery level of state licensure, which often provides for additional salary.

Incentives have been effective in raising the number of NBC teachers. Legislators

in these states credit their aggressive approach to their success in ensuring that more students have access to these accomplished, highly effective teachers.

### **NBC Teachers in Participating School District**

North Carolina has more NBC teachers than any state in the nation, with 20,677. The urban local school district used in this study, which will be identified as ABC School District for the purposes of this study, ranked as one of the top five districts statewide, with 541 NBC teachers; and ABC School District is the 83rd largest district in the nation. ABC School District serves approximately 54,900 students with the goal of providing a quality education for each child. The school district has 43 elementary schools, 13 middle schools, and 14 high schools.

The district also has a career center which serves as an extension of the regular high school program offering 33 advanced placement courses, 37 career/technical education courses, and 28 other special courses. Thirteen percent of the district's K-12 student population represents Exceptional Children. The majority of the Exceptional Children in the district are served through inclusion. Of the 6,859 identified students, 969 (14.1%) are in a separate setting.

The district used in this study had approximately 7,600 employees, half of which were teachers who utilized over 4,000 classrooms. Students were served by approximately 420 bus drivers; 575 food service workers; 300 housekeepers; and a network of administrators, principals, guidance counselors, psychologists, social workers, and other staff.

Some schools in the district were involved in major funding initiatives. During the 2015-2016 school year, 28 elementary and 15 secondary schools had school-wide Title I programs. Two of the Title I schools were recipients of School Improvement

Grants (SIG). Eight Title I schools were targeted with Race to the Top funding, and 12 elementary and three middle schools are participating in a 5-year teacher incentive fund called Star (School Transformation by Actively Recruiting, Rewarding, and Retaining). The district also consists of 16 magnet programs which focused on areas like Science Technology Engineering Mathematics (STEM), International Baccalaureate (IB), multiple intelligence, career academies, visual and performing arts, international studies, dual language immersion, and college prep.

The district had a very diverse student population: 43% of the students were Caucasian, 29% Black, 22% Hispanic, 2% Asian, 4% multi-racial, and less than 1% were American Indian. The growth of the Hispanic population in the county and subsequent enrollment of Hispanic students over the past decade doubled from approximately 11-22%, while the White and Black student populations in the district decreased. The percentage of students in the district receiving free or reduced-price lunch has increased from 44% a decade ago to 55% currently. Although economic conditions have worsened over the past few years, surprisingly, student mobility has been decreasing; however, mobility in Title I schools was still high and more than double the rate at non-Title I schools. This high student mobility rate posed a significant problem for Title I schools.

North Carolina offers statewide support for teachers interested in pursuing National Board Certification as a result of legislation adopted in 1994 and enhanced via the Excellent Schools Act in 1997. As mentioned earlier, NBC teachers move to a new salary schedule upon achieving National Board Certification, resulting in a 12% salary increase. In addition, the state grants full licensure renewal to all teachers completing the National Board Certification process, regardless of achievement. Also, teachers who are in the 10-year National Board renewal cycle will earn two credits (one for content and

one for literacy). In addition, the state grants eligible candidates 3 days of release time to give them time to work on the board certification process.

### **Hypotheses**

The hypothesis related to this research was that NBC teacher growth indexes would be higher compared to non-NBC teachers. The null hypothesis related to this research would then be that there was no difference between National Board Teacher Certification and higher student growth indexes. The alternative hypothesis in this case would be that growth-index scores were not, in fact, higher for NBC teachers compared to non-NBC teachers. There were numerous studies that indicated NBC teachers have an impact on student achievement and others that contradict. Evidence confirming the positive effect of NBC teachers on student achievement have been reported by Cavalluzzo (2004); Goldhaber and Anthony (2007); Smith, Gordon, Colby, and Wang (2005); and Vandevoort, Amerin-Beardsley, and Berliner (2004). Other researchers have questioned the link between NBC teachers and increased student achievement (Cantrell & Hughes, 2008; McCloskey et al., 2005; Stephens, 2003; Stone, 2002). While NBPTS professes to identify highly qualified teachers, the literature does not fully confirm that having National Board Certification guarantees that teachers are using research-based best practices.

### **Theoretical Framework**

This research determined whether a teacher's possession of National Board Certification relates to increased student performance on end-of-year state assessments. Because National Board Certification has been associated with teachers who have exceptional skill acquisition within the field of education, the foundation of the study was in Ericsson's Expertise Theory framework described by Chase and Simon (1973). The



expertise theory is premised on the idea that experts in a particular profession are able to demonstrate an advanced knowledge of in their field. These experts are able to apply this knowledge to professional practice with skills that are superior to others within that field (Vanlehn, 1996), who lack the same degree of expertise. Use of the expertise theory allowed the researcher to answer the pertinent questions of whether advanced certification was an accurate indicator of teacher effectiveness and, as a result, whether such certification bolstered student performance as measured by state assessments or if teachers with National Board Certification do not demonstrate significant levels of proficiency or effectiveness greater than teachers without the certification (Dawes, 1994).

### **Definitions of Terms**

The purpose of this study was to investigate the impact NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. The findings provide information about the effectiveness of NBC teachers on the increase in student achievement compared to non-NBC teachers (Grades 3-5) in selected Title I elementary schools in the ABC School District in central North Carolina. To clarify the current research study, definitions of the terms support an understanding of the research and the study for NBC teachers on student achievement.

**Eligible teacher.** A K-12 teacher who has met the requirements of NBPTS to attempt certification (NBPTS, 1994).

**EOG test.** Designed to measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study (Public Schools of North Carolina, 2018).

**EVAAS.** A value-added system that measures the level of learning that occurs

within a classroom or school (Amrein-Beardsley & Collins, 2012).

**Growth.** The average difference between students' current year and prior year.

**NBC teacher.** Teachers who successfully completed 10 assessments as measured by NBPTS; in addition, teachers who are highly qualified according to state of North Carolina (NBPTS, 2012).

**National Board Certification.** A document granted to an eligible teacher that identifies the teacher as having met standards that communicate what accomplished teaching looks like (NBPTS, 1998).

**NBPTS.** An independent, nonprofit, nonpartisan organization governed by a 63-member board of directors consisting of classroom teachers, school administrators, school board leaders, governors, state legislators, higher education officials, teacher union leaders, and business and community leaders (NBPTS, 2001).

**Non-NBC teacher.** A teacher who has not attempted the National Board Certification process and is not certified by NBPTS (Singleton, 2010).

**Student achievement.** Measures the amount of academic content a student learns in a determined amount of time (Carter, 2017).

**Teacher effectiveness.** A teacher's ability to produce significantly higher student achievement scores as indicated on EOG assessments (Goe, Bell, & Little, 2008).

Effectiveness can be documented by evaluating teaching practices that are associated with desired student outcome and the achievement of school goals through systematic collection of evidence about teacher planning and instruction, work with parents and students, or contributions to the school. (California Teacher Association, 2017, para. 9)

**Teacher index.** The teacher's impact on instruction is calculated for all value-

added purposes. The teacher index results from dividing the teacher estimate by its standard error. The index is comparable across teachers and is therefore the fair way to determine the effectiveness level category of does not meet expected growth, meets expected growth, or exceeds expected growth (EVAAS FAQ, 2013).

**Title I.** Part A (Title I) of the Elementary and Secondary Education Act, as amended (ESEA) provides financial assistance to local education agencies (LEAs) and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards (U.S. Department of Education, Student Achievement and School Accountability Programs, 2016).

### **Limitations**

The research study had limitations, including a smaller number of NBC teachers who taught Grades 3-5 than non-NBC teachers who taught Grades 3-5. The population consisted of 41 core elementary NBC teachers and 48 core elementary non-NBC teachers who taught Grades 3-5. Another limitation of this study was due to using participants who have taught grouped by three categories: 4-10 years, 11-20 years, and 21-30 years. Originally, 25 NBC and 25 non-NBC teachers were part of the research. This limitation was due to the amount of teacher index data that were provided from the district. The number of NBC and non-NBC teacher index data varied from participants of 89 throughout the elementary school part of the district.

### **Delimitations**

The findings of the study had implications and relevance for one school district in North Carolina. Within these parameters, the study findings can be generalized to the sample population of teachers in this school district. The data were collected and limited from various schools throughout the ABC School District. The study focused on one

academic school year, 2015-2016. The study's participants were limited to convenience sampling by school. The participants were teachers who taught in Grades 3-5 public schools in the ABC School District.

### **Summary**

This study examined whether teachers with National Board Certification were more effective than teachers who were not NBC in improving student achievement. The research measured EVAAS reports of the EOG assessment scores for students in Grades 3-5 assigned to NBC teachers and non-NBC teachers in an effort to offer a comparative analysis of data collected. While some researchers find no relationship between teachers who possess National Board Certification and student achievement, subsequent findings may indicate that there are statistically significant differences, as reported in EVAAS, of the EOG test scores for students assigned to NBC teachers and those assigned to teachers who are not NBC.

Chapter 1 provided an overview of the problem that inspired the study, significance of this research, background, theoretical framework for the study, and limitations/delimitations. Chapter 2 presents literature surrounding the topic of Title I schools, National Board Certification, student achievement, teacher effectiveness, and highly qualified teachers in North Carolina.

The third chapter provides an outline of the methodology that was used to conduct to the research. A quantitative approach was taken to complete the study. The researcher utilized archival data that ABC School District offered in the 2015-2016 academic school year. To address the questions, the researcher utilized EVAAS data from EOG testing. Quantitative data were collected from EVAAS. Independent sample *t* tests were conducted to compare the means from EVAAS data from NBC and non-NBC teachers.

An analysis of the data from three perspectives (overall, Title I, and non-Title I schools) was completed by paired sample *t* tests to compare the teacher mean growth index of the NBC and non-NBC teachers for reading and math in Grades 3-5.

Chapter 4 reports the data collected through methods and instruments discussed in the previous chapter. Results are displayed in tables. The data displayed in Chapter 4 were analyzed using computer software, Statistical Package for the Social Sciences (SPSS). Teacher mean growth-index scores were segregated into three perspectives (overall, Title I, and non-Title I schools) and then were compared with teacher years of experience. The fifth chapter of this research presents conclusions, implications of the study, and recommendations for future studies.

## **Chapter 2: Literature Review**

### **Introduction**

State and federal education reforms have intensified accountability for educators charged with providing high-quality instruction to children. Teachers are feeling the tension to prove themselves amidst constant education reform initiatives. National Board Certification is the highest accomplishment in the teaching profession (Boulder Valley School District, 2014). It allows teachers to hone their practice, showcase their talent in the classroom, and demonstrate their dedication to their students and their profession.

This chapter provides a literature review that examined what other research has said about the effectiveness of National Board Certification for Title I elementary schools in North Carolina in Grades 3-5. This chapter is divided into nine sections. The first is the conceptual framework that guided the dissertation. The framework for this study was grounded in Ericsson's Expertise Theory. Second, research-based concepts are explored as they relate to teacher effectiveness, student achievement, federal mandates, and state standards. Third, criteria for National Board Certification are explored, including the history of National Board, the Five Core Components, and the certification areas covered under the National Board process. Fourth, other studies are briefly examined as a means of providing support and opposition for National Board Certification as it relates to student achievement. Objectively analyzing both sides of this issue helped establish validity for the findings as well as support the premise that the research voided any biases towards a particular ideology for or against National Board Certification. The fifth section of literature examines National Board student achievement in Title I schools. The sixth section of the literature provides the background of Title I schools, how schools are designated for Title I funding, and implications for student achievement at such schools.

Seventh, the literature analyzes student achievement in the ABC Title I School District. The eighth section contains recent research on best teaching in low-socioeconomic schools. Ninth, part of literature delves into the purpose of North Carolina EOG testing. Finally, the last section discusses the educator effectiveness model.

### **Conceptual Framework**

Previous research on expertise focused primarily on areas such as science, medicine, sports, and the arts; however, current examinations of expertise performance have expanded into areas such as cognitive psychology and cognitive science (Ericsson & Smith, 1991). Ericsson (1996) provided a basis for measuring professional performance through what he referred to as expertise theory. This theory was used to examine professional performance standards, particularly how experts are always looking for ways to develop their skills to perform at the highest levels. Emphasis on the development of effective instructional practices also focuses on the development of expertise in the content areas (Ericsson & Charness, 1994).

Within the study of expert performance, individuals have been interested in assessing and comparing levels of performance under fair and controlled circumstances (Ericsson, 2006). Real expertise, according to Ericsson (2006), “must pass three tests: (1) It must lead to performance that is consistently superior to that of the expert’s peers; (2) real expertise produces concrete results; (3) true expertise can be replicated and measured in the lab” (Ericsson, Prietula, & Cokley, 2007, p. 2).

### **NCLB**

NCLB, a reauthorization of ESEA, aimed to increase student achievement through various methods that were not new to the field of education but had not been used as efficiently as possible. One of the ways in which to improve student achievement

was by placing a greater emphasis on accountability. The idea of accountability extends to all stakeholders responsible for the education of children, but the greatest responsibility rests on the shoulders of the classroom teacher. In summary, NCLB mandated that teachers employed by public school systems have attained highly qualified status, particularly teachers who work with minority students (Schultz, 2014).

Gamble-Risley (2006) considered Adequate Yearly Progress (AYP) a misnomer, or least an understatement, because satisfying the mandates demands a far greater than adequate effort. Established in NCLB, AYP required that districts and schools show a minimum, prescribed level of growth in student achievement until the years 2013-2016. Every eligible public school student must pass a state assessment in mathematics.

### **Every Student Succeeds Act (ESSA)**

Like its predecessor, ESSA holds states, districts, and schools accountable for student achievement. The new law, signed by President Obama in 2015, requires regular assessment to make progress and highlight weaknesses in core academic subjects. These assessment results must be reported in the aggregate as well as disaggregated by individual subgroups of students (low income or disability status, race, or ethnicity). Teachers can use information from assessments required under ESSA to make informed decisions and provide the best possible instruction for student learning.

Effective teachers use data to make informed decisions and are constantly improving classroom practice to better serve their students (Faria et al., 2014). One of the most important aspects of good teaching is the ability to discern which students are learning and which are not and then to tailor instruction to meet individual learning needs, which aligns with several of the core propositions of NBPTS. This alignment included teachers being able to manage and monitor the learning of the students; and



teachers are to be proficient in the subjects they teach and teach those subjects to their students (Cavalluzzo et al., 2014).

### **North Carolina**

North Carolina has the most NBC teachers. Goal 3 of the North Carolina State Board of Education (SBE) Strategic Plan states that every student every day has excellent educators. The objective of goal 3 was to develop and support highly effective teachers. Measure 3.1.1 was the percentage of teachers moving from “in need of improvement” or “effective” to a higher status of the education evaluation system.

### **Highly Qualified Status**

Provisions outlined in NCLB set forth standards by which federal and state agencies should identify educators who meet the basic criteria for being able to provide classroom instruction and/or support. Goe (2006) stated,

The current definition of *highly qualified* requires that teachers of core academic subjects meet the following criteria: (1) they have full state certification, (2) they hold at least a bachelor’s degree, and (3) they have demonstrated subject-matter competency in each of the academic subjects they teach. (p. 5)

More specifically, any elementary or secondary teacher in a public school system in the United States must be found “highly qualified” if they teach a core subject area such as English/language arts (ELA), mathematics, social studies/history/civics/economics, science/geography, foreign language, and art (Schultz, 2014). Likewise, special education teachers are required to meet provisions of highly qualified status if they teach in one of the core academic areas as well. As an indicator of highly qualified status, “National Board has been found to be an effective signal of teacher quality” (Cavalluzzo, 2004, p. 4).

## **Accountability**

In 1983, *A Nation at Risk* was published, reporting that students were not performing well when compared to their peers in other countries, which ultimately led to a new focus on teacher accountability measured by student assessment results (Vyrostek, 2009, p. 129). The report posted that education was a fundamental right for all children regardless of race and socioeconomic status (*A Nation at Risk*, 1983). It was the general understanding that it was the school's responsibility to support student achievement, and state testing should be used as a means to determine whether schools were meeting the needs of their students. Lips (2008) reported that even though it has been over 2 decades since *A Nation at Risk* was written, public schools in the United States are still in crisis, with millions of children matriculating through the education system without attaining a quality education.

As a result, in recent years, teacher accountability has made teacher evaluation more rigorous, with an increased emphasis on identifying valid and reliable methodology used to determine classroom teacher quality. NCLB and other federal and state mandates provide more accountability measures for the purpose of creating equitable opportunities for all children (Mehta, 2015). NBC teachers “have successfully gone through a rigorous, standards-based assessment process to affirm their knowledge of content and pedagogy, use of high-quality instructional practices, and involvement in professional activities” (Cavalluzzo, 2004, p. 6). The core propositions found in the National Board guidelines are indicators of well-prepared teachers who are highly qualified (Center on Education Policy, 2006) and capable of meeting the rigors of the teaching profession.

## **Student Achievement**

As evidenced by robust federal and state mandates establishing accountability

criteria, student achievement has become the central focus of education reform in the United States. Research using student scores on standardized tests confirms the common perception that some teachers are more effective than others and also reveals that being taught by an effective teacher has important consequences for student achievement (Rand Education, 2012). Lackluster test results, uneven distribution of the most highly qualified teachers, and the blatant inequity of resources between poor and affluent students demonstrated a greater need for an overhaul of past education systems (Schultz, 2014). For example, minority and poor students were historically expected to perform below their peers, and little effort was made to reconcile this fact. One of the likely reasons was that in the past, most school systems did not include student achievement as a factor in teacher evaluations (Piro, Wiemers, & Shutt, 2011).

Nevertheless, a shift towards reform has brought about increased efforts to make a connection between student growth and the classroom teacher's ability to teach. According to Rand Education (2012), the best way to assess teacher effectiveness is to look at their on-the-job performance, including what they do in the classroom and how much progress their students make on achievement tests. Opponents of this system of evaluating teachers argue that student assessment data does not give a comprehensive characterization of a teacher (New Teacher Project, 2012); poorer districts have a greater likelihood of serving students who are already well below grade level, while teachers in more affluent districts have an advantage of working with students having few, if any, academic deficits. Cuban (2009) even proposed that there is research that creates somewhat of a counter-argument against performance-based accountability, concluding that such systems of evaluation have done nothing more than changed the foundational principles of instruction and replaced them with trend-based teaching methodologies, yet

there appears to be a consensus that including student achievement data is necessary because it informs classroom instruction and improves student academic outcomes as a result (New Teacher Project, 2012).

Student achievement data are most commonly thought of as test results from state developed standardized assessments, especially in the current era of standards-based accountability (Dembosky, Pane, Barney, & Christina, 2005); however, schools and districts also frequently use other sources of achievement data such as classroom assessment or non-test data such as portfolios, writing journals, running records, or conference logs (Supovitz & Klein, 2003; Thorn, 2001; Young, 2005). Teachers matter more to student achievement than any other aspect of schooling (Rand Education, 2012).

### **Teacher Effectiveness**

When it comes to the education of children, teacher effectiveness was found to be the most influential variable for student learning than all other factors (Rand Education, 2012); however, questions remained as to how to measure teacher effectiveness as, prior to the Education Reform Movement initiated in the 21st century, there were no accurate, objective measures by which to gauge teacher performance in the classroom. “Measuring teacher performance is complicated and there is no formula for what makes a good teacher” (Callahan & Sadeghi, 2015, p. 49). New ideas began to develop as to how to align student achievement to more rigorous accountability standards that theoretically would filter out so-called bad teachers and reward teachers whose students were meeting expected growth. “Statistical data analysis confirms that most teachers vary substantially in their ability to promote student achievement growth” (Kane, Wooten, Taylor, & Tyler, 2011, para. 2).

Results from the process showed that teaching was too multitiered to have any

one method of measuring performance (Danielson, 2013), and single measures were too narrowly focused to fairly determine whether a teacher was meeting expectations in classroom instruction. Other factors such as student achievement and creative thinking processes are examples of additional criteria that can be used to gain a better perspective of teacher efficacy (Evans, Wills, & Moretti, 2015). This ideology is echoed within the Measures of Effective Teaching Gathering Report (2017), which found multiple performance measures would allow administrators to develop a more comprehensive profile of whether teachers were meeting targeted teaching standards and, as a result, increasing overall student achievement (New Teacher Project, 2012). In addition, research suggests a positive correlation between methods that measure the impact that teachers have on student learning in specific core areas such as mastery of higher order skills and overall reliability of scores as reported annually (Doyle & Han, 2012) by state and local public education agencies. Staples (as cited in Marzano, Toth, & Schooling, 2012) stated,

The Marzano Causal Teacher Evaluation Model provides teachers with specific feedback to improve the quality of their teaching. We know that is the single most important factor when it comes to student achievement. The whole system is really focused on teacher improvement and development. (p. 8)

Despite what was known about the correlation between teacher contributions in the classroom and targeted student learning, there has been little research-based evidence that supports the value of any particular measure of teacher performance. In fact, just meeting the minimum requirements to achieve highly qualified status does not guarantee that a teacher will be effective in the classroom (Goe et al., 2008). Teacher evaluations should not be limited to how well students perform on assessments (Doyle & Han, 2012).

In fact, teacher effectiveness can change at any stage of a teacher's career (Kini & Podolsky, 2016); however, it has been suggested that student achievement was one of the most efficient methods of measuring teacher ability to teach more than any other variables, including advanced degrees and tenure (New Teacher Project, 2012). In fact, research suggests a positive link between student success in the classroom and overall teacher efficacy (Darling-Hammond, 2015). Several studies have found evidence that National Board Certification processes can be used to identify those teachers who are positively linked to increasing student gains (Darling-Hammond, 2010).

### **Teacher Quality**

Darling-Hammond (2000) examined ways in which teacher qualifications and other school inputs were related to student achievement across states. The findings in this study indicated the measures of teacher preparation and certification were by far the strongest correlates of student achievement in reading and mathematics, both before and after controlling for student poverty and language status. Barber (2008) added to this dialogue, signaling that teacher effectiveness was by far more important to student achievement than variables such as socioeconomic status and class size. Tan (2001) has cited the work of Baer, Fernstermacher and Soltis, and Simonton and asserted that teacher beliefs, attitudes, and educational philosophies influence their teaching approaches. Teacher beliefs, attitudes, and philosophies also influence the classroom climate and roles that teachers may adopt. Similarly, Henson (as cited in Yilmaz & Cavas, 2008) argued those teacher beliefs affect classroom management, which is essential for effective classroom teaching.

National Board Certification is used as the leading standard for measuring teacher quality (Goldhaber & Anthony, 2007). Goldhaber and Anthony (2004) conducted a

large-scale study based on a unique data set from North Carolina which assessed the relationship between the certification of teachers who were NBPTS and elementary level student achievement. Their findings proved that NBPTS was successful in determining the more effective teachers among applicants and that NBC teachers, prior to becoming certified, were more effective than their noncertified counterparts at increasing student achievement. Findings from several studies, including one conducted by Goldhaber and Hansen (2009) using data from North Carolina, indicated that students whose teachers ranked in the top percentiles made significantly more gains and had more positive student outcomes (Goldhaber & Anthony, 2007) than students assigned to teachers in the lower percentiles.

Metzler and Woessmann (2010) researched the impact of teacher subject knowledge of student achievement. Results from the research indicated that overall teacher quality is an important basis for student outcomes. Likewise, other factors were measured including teacher education, experience, and test scores. Only test scores and student achievement were found to have the strongest correlation to teacher knowledge. In a report commissioned by Congress, the National Research Council (2008) drew similar conclusions, stating that there was undisputable evidence that NBC teachers are more effective when it comes to student achievement.

### **Criteria for National Board Certification**

NBPTS was created in 1987, predicated on the belief that teachers are instrumental in increasing student achievement. The primary components of NBPTS were based on recommendations made in a report issued by the Carnegie Task Education, specifically the need to “identify and recognize teachers who effectively enhance student learning” (NBPTS, 2001, p. 2). There are approximately 97,000 teachers who are

certified by the National Board in the United States (Hall, 2012).

### **History of National Board Certification**

The Carnegie Task Force on Teaching's report brought to light many of the critical issues that plagued the educational systems throughout the country (NBPTS, 2001). The report published in 1983, *A Nation at Risk*, was instrumental in initiating school reform movements that became the catalyst of 20th and 21st century education and exposed deficits that were leading to the substandard education of many American school children. For example, results of academic tests administered revealed that students in the United States fell significantly behind their peers in other industrialized countries.

A primary concern was that the public school system was not adequately preparing students to be problem solvers in real world environments in which they would compete and collaborate with their global peers. The Carnegie Task Force functioned in an advisory capacity to inform educators of those areas that were most critical for promoting student learning. A new report entitled *A Nation Prepared: Teachers for the 21st Century* (1986) outlined a plan to reconstruct the nation's schools' antiquated ideologies of curriculum and instruction and the professional development of its educators, paving the way for more comprehensive, robust reform. In essence, schools would become responsible for preparing students to meet the demands of global citizenship.

Because of the research and identification of the most relevant and critical components of teaching and learning, the Task Force proposed the development of a NBPTS. In addition, the Task Force issued another report, *What Teachers Should Know and Be Able to Do*, as a blueprint for educators interested in improving the instructional



practices of teachers at all levels of education, from elementary schools all the way to the university level (NBPTS, 2016).

### **Research on National Board Certification that Impacts Student Achievement**

Policymakers are placing greater emphasis on the value of National Board Certification (Cowan & Goldhaber, 2016), examining whether teachers with certification have more students making gains on achievement tests than students of teachers who are not certified by the National Board (Goldhaber & Anthony, 2004). This heightened interest may be directly related to the plethora of studies that seem to confirm that students who have highly qualified teachers are more likely to establish a pattern of significant achievement gains in all subject areas but fail to show similar measures of success when it comes to the impact of National Board Certification on student achievement (Harris & Sass, 2009).

Several issues should be addressed when it comes to examining student performance and teacher certification through the National Board Certification process. First, studies about the effectiveness of National Board Certification on teacher professional ability often use small sample sizes used to establish credibility in the field. Small samples may lack enough statistical evidence to generalize the study findings to the NBC teacher population as a whole; therefore, results may be perceived by some to be meaningless when trying to authenticate links between student performance and teacher ability (Goldhaber & Hansen, 2009). For example, findings reported by Cavalluzzo (2004) found statistically significant differences between NBC teachers and those without certification, but overall effects were small. Moreover, the studies conducted often do not use the same variables (student and teacher populations) to collect, analyze, and report findings, which may cause some discrepancies when trying to

draw conclusions about the effectiveness of National Board Certification (McCloskey et al., 2005).

It should be noted that studies about the impact of NBC teachers on student achievement demonstrate mixed results as to whether student performance is positively impacted when a teacher has been certified. For example, earlier studies conducted during the infancy stages of the National Board process usually did not find any statistically significant differences in student measures (i.e., assessment results, attitudes), while later studies suggested positive correlations between student achievement and teacher certification through the National Board. Findings from seven studies (Belson et al., 2015; Goldhaber, 2006; Harris & Sass, 2009; Holding & Fraser, 2013; Phillips, 2008; Rouse, 2008; What Works Clearinghouse, 2009) have been summarized to include as much demographic information as possible, such as participant profiles, area of assessment and setting as well as measures used and overall results. Review of previous literature provides a context for how future studies are needed to determine the true effectiveness of National Board Certification as well as implications for student learning and achievement. Goldhaber and Anthony (2004) examined the relationship between National Board Certification status and pre- and post-student achievement. During the 3 years in which data were examined, the researchers found that students of NBC teachers significantly outperformed those of their non-NBC teacher counterparts, though the gains were small.

What Works Clearinghouse (2009) analyzed data from over 3,000 elementary school students in the Los Angeles Unified School District to determine whether having a teacher with NBPTS certification improves student achievement. The study was conducted from 2003-2004 and 2004-2005, with data from comparison groups (NBPTS

certified teachers versus non-NBPTS teachers) to see if there was a statistical difference in math and language arts test scores for these students. Findings indicated that student test scores were lower for teachers who were not NBPTS certified.

In her study, Phillips (2008) used data from the South Carolina Physical Education Assessment Program to determine whether there were differences in student levels of proficiency when their teachers were NBC as opposed to students whose teachers were not. Data were collected and analyzed in four areas: motor skill performance, cognitive fitness knowledge, outside-of-class participation, and health-related fitness levels. Overall outcomes, once student scores were weighted and calculated, suggested a stronger measure of competency in all four areas when teachers were certified compared to the same score results for students of teachers who were not certified by the National Board.

In his summary of findings that detailed the efficacy and performance of NBC teachers, Goldhaber (2006) used three core questions as the foundation his research brief: “(1) who applies for and becomes National Board certified? (2) Where do National Board Certified Teachers (NBCTs) teach? (3) Are they more effective than other teachers” (p. 375). Goldhaber (2006) reached several conclusions. First, NBC teachers were more effective in practice than non-NBC teachers. Second, NBC teachers were less likely to teach students who were low performing. Finally, non-NBC teachers had a higher probability of not seeking such certification if they worked in schools with low-performing students.

### **Positive Correlation of National Board Certification**

Goldhaber and Anthony (2004) examined the relationship between National Board Certification status and pre- and post-student achievement. A subsequent study by

Goldhaber and Anthony (2007) conducted a 3-year longitudinal study about any relationship between student achievement and teacher National Board Certification in the state of North Carolina. Looking exclusively at Grades 3-5, the researchers spent 3 years observing 32,000 teachers. As with previous studies, results indicated that students of NBC teachers demonstrated greater gains in reading and math when compared to students of non-NBC teachers.

Over 90% of the 8,200 teachers with National Board Certification nationwide surveyed indicated that they believed National Board Certification improved their teaching; 80% or more felt that certification had advanced their ability to be more innovative in their approach to teaching and learning (Byrd & Rasberry, 2011). What Works Clearinghouse (2009) analyzed data from over 3,000 elementary school students in the Los Angeles Unified School District to determine whether or not having a teacher with NBPTS certification improves student achievement. Findings indicated that student test scores were lower for non-NBC teachers. A similar report produced by Hakel, Koenig, and Elliott (2008) included results from 11 studies of achievement test scores from a comparison group of students with NBC teachers and students of teachers who have not been certified through the National Board process. Based on results from analysis of the studies, students made greater gains on achievement tests when they were taught by NBC teachers as opposed those students who were not.

In their research study, Holding and Fraser (2013) provided a caveat that previous research had not focused on learning environment criteria in evaluating the effectiveness of the system of teacher certification sponsored by the National Board. As a result, the researchers were particularly interested in exploring how the field of learning environments could be used to evaluate the effectiveness of teachers who were certified

by the National Board and how their students perceived classroom environments.

Participants were 443 students in Grades 8 and 10 enrolled in schools in South Florida.

Students were assigned to science courses taught by NBC teachers. A comparison group was created with 484 students enrolled in science courses taught by teachers who did not have National Board Certification. Holding and Fraser found that there was a statistically significant difference indicating higher aptitudes for student learning when teachers had National Board Certification.

### **Research Findings Indicating Little or No Effect of National Board Certification on Student Achievement**

Examining the relationship between National Board Certification and North Carolina student EOG tests in reading and math, McCloskey et al. (2005) analyzed student test scores from over 300 teachers in three North Carolina public school districts over a 2-year period. It was concluded that there were no significant differences in reading and math scores between students who were assigned to teachers who were certified through the National Board Certification process and students of teachers who were not.

Early studies conducted during the infancy stages of the National Board process were less inclined to find any statistically significant differences in student measures (i.e., assessment results, attitudes), while later studies suggested positive correlations between student achievement and teacher certification through the National Board. Findings from several studies (including Belson et al., 2015; Goldhaber, 2006; Harris & Sass, 2009; Holding & Fraser, 2013; Phillips, 2008; Rouse, 2008; What Works Clearinghouse, 2009) have been summarized to include as much demographic information as possible, such as participant profiles, area of assessment and setting as well as measures used and overall

results; however, most notably, the researchers found a statistically significant positive correlation between the proportion of teachers with National Board Certification and student scores on reading and math exams at the state level. Review of previous literature provides a context for how future studies are needed to determine the true effectiveness of National Board Certification as well as implications for student learning and achievement.

### **No Correlation between National Board Certification and Student Achievement**

Harris and Sass (2009) conducted their study during a time when National Board Certification was a relatively new concept. They were most interested in, like other studies presented in this literature, whether or not the certification provided teachers with an advantage relative to student achievement. This longitudinal study focused primarily on whether or not a relationship existed between teachers who have National Board Certification and higher student test scores on low-stakes and high-stakes exams; however, Harris and Sass found no positive correlations between National Board Certification and student achievement in their research. In fact, Harris and Sass found that student performance was positively impacted in only a few cases, indicating no statistically significant difference in achievement scores. Furthermore, the researchers reiterated the conclusion that National Board Certification is not necessarily an indicator of teacher effectiveness in the classroom.

Rouse's (2008) study was grounded in the theory that NBPTS improve teacher quality based on a rigorous, systematic set of standards for teachers that may impact student achievement in classrooms across the United States. The study was based in North Carolina and involved 54 students in Grades K-8 who were educated by NBC teachers and non-NBC teachers in comparison groups. The groups were equally

distributed with 27 NBC teachers and 27 non-NBC teachers. Unlike findings from the studies previously summarized in this literature, Rouse concluded that there was not a statistically significant difference in student achievement for NBC teachers and non-NBC teachers in the comparison groups.

Boulden's (2011) mixed-methods study evaluated an NBC teacher program in Kentucky. The analysis of data resulted in the following findings: second and third grade NBC teachers in the Fayette County Public Schools had significantly greater Response to Intervention (RIT) growth in the area of reading than non-NBC teachers; however, there was not a significance difference in RIT growth for fourth and fifth grade NBC teachers and non-NBC teachers. With regard to impacting colleagues, the data revealed that the teachers surveyed did not indicate that NBC teachers provide more help in the areas of behavior management, instruction, and assessment than non-NBC teachers; however, when both groups of teachers self-reported the numbers of colleagues they had assisted during the school years, NBC teachers assisted a significantly greater number of teachers than non-NBC teachers in the area of assessment. Additionally, the data indicate that 4.6% of the teaching population (NBC teachers in Fayette County Elementary Schools) is providing 33% of all mentoring activities that aid in developing the instructional capacity of teachers within the sampled school buildings.

### **National Board Student Achievement in Title I Schools**

The purpose of Harris's (2013) causal-comparative research and statistical analysis procedure of ANCOVA was to determine the difference in mathematics mean scale score growth on the Mississippi Curriculum Test 2nd edition (MCT2) assessment between fourth grade African-American and Caucasian students taught by NBC teachers and those taught by non-NBC teachers while controlling socioeconomic status and third

grade MCT2 mathematics scale scores. Secondly, was there a statistically significant difference in mathematics mean scale score growth on the MCT2 mathematics assessment between fourth-grade students by socioeconomic status based on eligibility for free/reduced or full pay lunch taught by NBC teachers and those taught by non-NBC teachers, while controlling race and third grade MCT2 mathematics scale scores. The results of the analysis for Research Question 1 indicated there was not a statistically significant difference in mathematics mean score growth on the MCT2 mathematics assessment between students by race taught by NBC teachers and those taught by non-NBC teachers. African-American and Caucasian students taught by NBC teachers had a comparable mathematics mean scale score growth with African-American and Caucasian students taught by non-NBC teachers. The results of the analysis for Research Question 2 indicated there was a statistically significant difference in mathematics mean score growth on the MCT2 mathematics assessment between students by socioeconomic status based on eligibility for full pay lunch taught by NBC teachers and those students taught by non-NBC teachers. Students identified as full pay lunch taught by NBC teachers had a higher mathematics mean scale score growth than those students identified as full pay lunch taught by non-NBC teachers. Students identified as free/reduced lunch status taught by non-NBC teachers had comparable mean scale score growth with those students identified as free/reduced lunch status taught by NBC teachers, but not statistically significant.

McDaniel (2010) used an ex post facto study to examine academic differences in student performance in Title I schools taught by NBC teachers. This 1-year academic school year study focused on whether or not there was any relationship between teachers who attained National Board Certification and higher student achievement in Title I



schools. The National Board and Non-National Board Certification status was the primary independent variable, and student achievement was the dependent variable for the research. The focus of the study was the reading and math quarterly benchmark scores of 610 students in Grades 3-5. Additionally, the researcher sampled students from 16 Title I schools in an Oklahoma school district. Based on data collection and analysis, findings indicated a difference in student achievement across benchmark periods. Further analysis suggested a significant difference in reading achievement for students during administration of the first benchmark assessment; however, mathematics benchmarks yielded slightly different results. Benchmark assessment results for mathematics revealed inconsistencies across testing periods, though teachers having National Board Certification was not considered to have a significant student level predictor of changes in math achievement. In fact, assessment results of students whose teachers were NBC were slightly below those of students whose teachers who did not have National Board Certification.

Rorie's (2014) quantitative correlational study was conducted to determine if a relationship exists between NBC teachers and reading achievement in elementary schools. The study included a comparison of the average mean developmental scale scores from the EOG tests for a 3-year period between NBC teachers at the Master's and Bachelor's levels and teachers without National Board Certification at the Bachelor's and Master's levels. An analysis of variance (ANOVA) was performed using the average developmental mean scores of the Bachelor's and Master's groups with the teachers serving as the independent variable and the developmental scale scores as the dependent variable. The implications of this study indicated that there was not a measurable difference of effect between the two sample groups at the Bachelor's or Master's level.

Benigno's (2005) study compared the standardized test scores of students who were taught by non-NBC teachers in an effort to determine if there was a significant difference in the two group scores. The Mississippi Curriculum Test (MCT) scores from the spring of 2003 were used as the pretest and the MCT scores from the spring of 2004 were used as the posttest. An analysis of covariance was used to examine 10 comparisons involving eight NBC teachers and 14 non-NBC teachers in the MCT tested areas of reading, language, and math for Grades 3-8. Benigno controlled for demographic factors by ensuring that all match group comparison involved teachers from the same school, teaching the same subject, at the same grade level. The study involved a total of 22 teachers, 785 students, and 2,330 test scores from three schools in a single Mississippi school district. The findings revealed that in seven of 10 comparisons, the student scores of non-NBC teachers had a higher mean score growth difference in comparison to the student scores of the NBC teachers. The study also found that in two of 10 comparisons, the non-NBC teacher students had significantly higher test scores than the NBC teacher students. This significant difference was found in fourth-grade language and fifth-grade math.

### **Title I Schools**

Title I was created as a means of improving the educational outcomes of historically marginalized children (Sousa & Armor, 2016), particularly those living in impoverished conditions and minorities. LEAs target the Title I funds they receive to public schools with the highest percentages of children from low-income families. Title I provides extra help to the students who need it the most. These are the children who are the furthest from meeting the standards the state has put into place for all children. States today are facing deep cuts to education while struggling to close the achievement gap and

turn around Title I schools (National Conference of State Legislatures, 2011). Title I, Part A funding is money designated from the ESEA of 1965 to improve educational outcomes for low-income students. More than 56,000 public schools across the country used Title I funds to provide additional academic support and learning opportunities to help low-achieving children master challenging curricula and meet state standards in core academic subjects in the 2009-2010 school year (U.S. Department of Education, Student Achievement and School Accountability 2016). Approximately 90% of public schools receive Title I funds (U.S. Government Accountability Office, 2011), with billions of dollars being allocated to nearly 20 million students across the nation (Weinstein, Stiefel, Schwartz, & Chalico, 2009).

The federal government grants Title I money to schools based on the percentage of students in poverty at the school. Title I is designed to support state and local school reform efforts to reinforce and amplify efforts to improve teaching and learning for those students farthest from meeting state standards. Schools with poverty rates below 40% and those choosing not to operate a school-wide program offer “targeted assistance programs” in which the school identifies students who are failing or most at risk of failing, then designs an instructional program to meet the needs of those students. Schools with poverty rates above 40% can choose to operate a “school-wide” program. School-wide programs do not identify specific students for Title I programming. Instead, schools upgrade the programming to the entire student population. McClure, Weiner, Roza, and Hill (2008) stated, “The purpose of this program is ‘to provide financial assistance...to local educational agencies serving areas with concentration of children from low-income families to expand and improve their educational programs... [to meet] the special educational needs of educationally deprived children’” (p. 12). In 2008, 42%

of NBC teachers were teaching in schools eligible for Title I funding. In the ABC School District, there were 765 teachers who taught in elementary schools. In the 2015-2016 academic school year, approximately 8% (65 of 765) of the teachers were NBC. Nearly 5% (40 of 765) of the teachers are teaching at a non-Title I school in the ABC School District.

In 2008, 42% of NBC teachers were teaching in schools eligible for Title I funding. Nearly 46% taught in schools where more than 40% of students were eligible for free and reduced lunches (NBPTS, 2008).

### **Student Achievement in ABC Title I Schools**

Title I is the largest federal education program outlined by ESEA, the predecessor of what is now known as NCLB (Pitt County Schools, 2016). Title I provides over \$13 billion to local districts to improve the academic achievement of children in high-poverty schools. In the state of North Carolina, the criteria for Title I status is 40% of the student population in elementary schools must be classified as economically disadvantaged and 75% of students in middle and high school must meet the standard for economically disadvantaged (Cumberland County Schools, 2016). The ABC School District, the setting for this study, has 43 elementary schools of which 28 have been identified as Title I. Under the federal NCLB, the state is required to set target goals that schools must meet to make Annual Measurable Objectives (AMO). In 2013, the ABC School District met 76 of its 81 AMO targets, and 37% of all elementary schools met AMO targets; however, 10% of the elementary schools were designated as not meeting growth targets in reading and mathematics. According to state mandates, Title I schools in North Carolina require

1. Completion of a comprehensive needs assessment for all school functions.
2. Implementation of school reform strategies to address the student and school

needs.

3. Highly qualified status must be attained by all teachers and teacher assistants working in the Title I school.
4. School needs must be addressed with fidelity through professional development for all staff.
5. Efforts must be made to recruit teachers who are highly qualified to work in schools that have the highest needs or in subject areas that have critical shortages of personnel.
6. Curriculum and assessment must be data driven.
7. Increased efforts must be made to involve parents in school processes.
8. Transitions between grade levels must be strategically planned and implemented (NCDPI, n.d.).

### **Teaching in Low-Socioeconomic Schools**

More families in the United States are living in poverty (Costley, Bell, & Leggett, 2014). Children from more affluent homes have historically performed better on standardized tests than students from lower socioeconomics (Silvernail, Sloan, Paul, Johnson, & Stump, 2014). Poor and minority children do not underachieve in school just because they often enter behind; it is also because the schools that are supposed to serve them actually shortchange them in the one resource they most need to reach their potential: high-quality teachers (Peske & Haycock, 2006). Teachers who are better trained, more experienced, and fully licensed in the subjects are more likely not to teach in low-poverty schools, serving more academically advantaged students (Lankford, Loeb, & Wycoff, 2002); however, students who live in poverty generally attend schools where the teachers are less qualified, are not fully certified, lack experience (Gagnon &

Mattingly, 2015), and are not fully certified. In comparison to the previous research, the ABC School District has 30 NBC teachers in the Title I schools and 36 NBC teachers in the non-Title I schools. The ABC School District has 28 Title I elementary schools and 17 non-Title I schools. In the ABC School District, there are 547 NBC teachers, which ranks as the 16th in the nation and fourth in the state of North Carolina for total numbers of NBC teachers.

### **Purpose of North Carolina's EOG Testing**

The North Carolina EOG tests are designed to measure student performance on the competencies specified in the goals and objectives of the North Carolina Standard Course of Study. North Carolina EOG tests are required by General Statute 115C.174.10 as a component of the North Carolina Annual Testing Program. As stated, the purposes of North Carolina state-mandated tests are (a) to assure that all high school graduates possess those minimum skills and that knowledge thought necessary to function as a member of society; (b) to provide a means of identifying strengths and weaknesses in the education process in order to improve instructional delivery; and (c) to establish additional means for making the education system at the state, local, and school levels accountable to the public for results (NCDPI, 2006).

This test was one component of the EOG tests, which include reading comprehension and mathematics tests in Grades 3-8 (students in Grade 3 began taking a reading comprehension and mathematics pretest in the fall of 1996). The scores from the EOG tests are used to obtain a growth indicator used for school, school system, and state accountability purposes.

North Carolina public school students in Grades 3, 5, and 8 are required to meet statewide standards (gateways) for promotion in addition to local promotion

requirements. The EOG mathematics test is one part of each gateway. Students must demonstrate grade-level proficiency by scoring at or above Achievement Level III on the test. For students who do not meet gateway requirements, the student accountability standards include procedures (safeguards) for retesting as well as a formal review process.

### **North Carolina EOG Test Administered**

During the final 10 days of the school year, students take the state-required North Carolina EOG assessments of ELA/reading, mathematics, and science. The ELA/reading and mathematics assessments are administered to students in Grades 3-8 as part of the statewide assessment program. Science is administered to students at Grades 5 and 8. These curriculum-based achievement assessments are specifically aligned to the North Carolina Standard Course of Study and include a variety of strategies to measure the achievement of North Carolina students. Student scores in ELA/reading, mathematics, and science from the EOG assessments are used for computing school and teacher growth as well as performance composites, as required by the state-mandated READY Accountability Program. They are also used in determining AMOs intended to improve educational outcomes for all students and close achievement gaps. AMO reporting is required under the ESEA waiver obtained by North Carolina in May 2012 and the renewal granted through the 2014-2015 school year. This waiver granted North Carolina flexibility regarding specific requirements of NCLB.

### **Key Features of the EOG ELA/Reading Assessments**

Some of the key components of the ELA/reading EOG assessment include (a) the assessment of reading knowledge of vocabulary are assessed by having students read selections and answer questions related to the selections; (b) selection on the assessment

chosen to reflect the variety of actual reading done by students in and out of the classroom; (c) students read literary selection (i.e., fiction, nonfiction, and poetry) and informational selections (i.e., content and consumer); (d) the variety of selections allow for the assessment of reading for various purposes: to acquire literary experience, to gain information, and to perform a task; and (e) the estimated time for students at Grades 3-5 to complete the ELA/reading assessment is 180 minutes. Student who are not finished at the end of the estimated time may be given additional time; however, no administration of ELA/reading assessment at Grades 3-5 may exceed 240 minutes.

### **Key Features of the EOG Mathematics Assessments at Grades 3-5**

The EOG mathematics assessment for Grades 3-5 has several key features, including (a) assessment of student achievement in the five strands of the mathematics curriculum: operations and algebraic thinking, number and operations in base 10, number and operations—fractions, measurement and data, and geometry; (b) calculator inactive and calculator active. The minimum (“at least”) calculator requirement for Grades 3-5 is a four-function calculator with memory key; (c) 54 multiple-choice items. The mathematics assessment at Grade 5 consists of 46 multiple-choice items and eight gridded response items; (d) some of the mathematics items at Grades 3-5 are experimental (field test) items. These items do not count toward or against the student’s score; and (e) estimated time for students at Grades 3-5 to complete the mathematics assessments is 180 minutes. Students who are not finished at the end of the estimated time may be given additional time; however, no administration of the EOG assessment may exceed the 4-hour maximum time allowed (NCDPI, 2015).

Appendix C provides details for reading and mathematics achievement level descriptors for Grades 3-5.



## **Educator Effectiveness Model**

In the early 1980s, Dr. William Sanders at the University of Tennessee Knoxville founded the EVAAS approach to measure growth. The EVAAS approach overcame many nontrivial statistical issues associated with measuring student growth. In 1993-1994, Tennessee Value Added Assessment (TVAAS) released district- and school-level reports statewide. In 1996, TVAAS released teacher-level reports statewide.

EVAAS for K-12 is a customized software system available to all North Carolina school districts. EVAAS provides North Carolina educators with tools to improve student learning and to reflect and improve on their own effectiveness.

EVAAS examines the impact of teachers, schools, and districts on the learning of their students in specific courses, grades, and subjects. The North Carolina SBE has selected EVAAS as the statewide model for measuring student growth when common assessments are administered. In 2005, EVAAS was implemented in pilot districts in the state as a school improvement resource. EVAAS was implemented statewide as a school improvement resource in 2006. Beginning in 2011-2012, EVAAS became a formal part of the state's teacher evaluation and accountability.

## **Measuring Growth**

SBE has approved the use of EVAAS to calculate student growth values with results from the EOG assessment. SAS EVAAS provides educators with access to valuable information across LEAs, regions, and standards. Consortium for Educational Research and Evaluation-North Carolina conducted an evaluation of the current evaluation system that compared alternative value-added measures of student growth and found that the EVAAS measure was one of three top-performing approaches (Henry & Guthrie, 2015). Each teacher receives a value-added estimate and standard error for each

tested subject and grade. The value added and standard error can ascertain the certainty that students in the classroom made more or less than the expected progress. The teacher's value added summary report will indicate the teacher's effectiveness level for the academic school year. The rules of effectiveness level determination are depicted in Table 1.

Table 1

*The Rules of Effectiveness Level Determination*

	Exceeds Expected Growth: Significant Evidence that the teacher's students made more progress than the Growth Standard (teacher's index is 2 or greater)
	Meets Expected Growth: Evidence that the teacher's students made progress similar to the Growth Standard (the teacher's index is between -2 and 2)
	Does Not Meet Expected Growth: Significant evidence that the teacher's students made less progress than the Growth Standard (the teacher's index is less than -2)

**Calculation of Achievement**

In 2011, North Carolina proposed a plan to calculate teacher effectiveness that was based on a weighted average of individual teacher value-added scores and school value-added scores using EVAAS estimations. An analysis of this approach revealed that low-performing teachers in high-performing schools scored higher, while high-performing teachers in low-performing schools received lower scores (Garland, Johnson, & Preston, 2013).

As a result, in May 2013, the State Board approved an amendment that altered the calculation of teacher effectiveness. A teacher's growth value now is based only on the student growth values for the individual students taught by that teacher.

## Summary

The literature established an overview of teacher effectiveness, accountability, student achievement, Title I schools, NBPTS, and the research findings on how National Board Certification impacted student achievement. The literature provided an outline of EOG testing, the history of EVAAS, measuring growth, and calculation of achievement.

Although research findings varied, it appears that a relationship exists between teacher quality and student achievement. Notably, Clotfeler, Ladd, and Vigdor (2006) conducted two separate studies to determine whether there was any direct correlation between NBC teachers and student achievement. In the first study, the researchers found, after collecting and analyzing data from North Carolina elementary schools between 1994 and 2004, that the students of NBC teachers scored higher on their reading and math assessment compared to the students of non-NBC teachers. A second study conducted by the authors the following year yielded slightly different results. Assessment data for fifth graders in North Carolina (from 1999-2000) performed higher on reading assessments but not on their math assessments.

The purpose of this study was to investigate the impact that NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. The mission of NBPTS was to advance the quality of teaching and learning by identifying accomplished teaching (NBPTS, 2016). A teacher who earns the National Board Certification credential has undergone a scrutinizing process and has been determined to be someone who is accomplished, makes sound professional judgments, and acts in accordance with those judgments (Shakowski, 1999).

This study was expected to answer the question as to whether National Board

Certification makes teachers more effective than teachers who do not have certification with respect to student achievement. This is important because of the emphasis on teacher effectiveness in addition to federal and state mandates outlining student achievement and expected growth. Likewise, it is also important to know in order to justify the huge expense of larger salaries for National Board Certification. Moreover, findings could offer more insight into whether teachers even need National Board Certification to be considered effective in the classroom.

Chapter 3 contains quantitative research, instrumentation, data analysis, and collection used to conduct the present study. Confidentiality, validity, and reliability are topics examined with regard to data analysis using SPSS computer software.

### **Chapter 3: Research Methodology**

#### **Restatement of Purpose**

The purpose of this study was to investigate the impact that NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. This study involved the use of a quantitative research method to address the study's goals of determining whether students of NBC teachers demonstrated higher achievement compared to students of non-NBC teachers. SAS EVAAS fact sheet included "value-add measures that reflect how educators are accelerating student progress" (SAS, 2014, para. 2). EVAAS data are relevant to the research questions presented in this study, particularly as they relate to teacher relationship on student growth.

While research on teachers holding National Board Certification has produced mixed results, previous studies (Cowan & Goldhaber, 2016; Goldhaber & Anthony 2004; Hakel et al., 2008; Petty et al., 2016) tended to find that National Board Certification is a significant predictor of student growth. The research questions this study addressed included

1. For students in Grades 3-5 in Title I schools, what was the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests?
2. For students in Grades 3-5 in Title I schools, what was the relationship of teacher math growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG math tests?

National Board Teacher Certification is used as a turnaround strategy to improve teaching and learning in low-performing schools. According to a study conducted by Laitsch (2004), “although teacher effect was positive at all grade levels in both math and reading, NBPTS certified teachers’ greatest impact was on economically disadvantaged students and younger students (students in third grade) and achievement in math” (para. 5). Students of NBC teachers outperformed students of non-NBC teachers on achievement tests, and the positive impact of NBC teachers was even greater for minority students (Cavalluzzo, 2004; Goldhaber & Anthony, 2004).

### **Participants**

The participants for the study included NBC and non-NBC teachers who have taught in the ABC School District in the central part of North Carolina during the 2015-2016 academic school year. The participants were a cluster sample of students from 41 core NBC elementary teachers and 48 core non-NBC elementary teachers, giving a total of n=89. Teacher effectiveness was measured using teacher mean growth indexes in reading and math. The EVAAS scores of elementary NBC teachers in this study were matched with elementary non-NBC teachers in the same school district of the participating LEA in terms of reading and mathematics. Because of the 3-year requirement of teaching service to qualify for National Board Certification, non-NBC teachers must have had at least 3 years of teaching experience to participate in this study. Appendix D explains the dynamics (grade and specialty areas) of the NBC teachers in the ABC School District at their Title I elementary schools.

In addition, 89 core elementary teachers were categorized into three perspectives: overall, Title I, and non-Title I school samples. The generalization of the study was limited to the individuals from the participating LEA, ABC School District.

## Research Design

This researcher collected quantitative data. A quantitative design incorporates a quantitative (statistical) approach when determining the outcomes of a study. For the quantitative aspects of the study, test data from EVAAS were collected and analyzed for an academic school year period. The number of teacher participants was projected to be relatively small ( $n=89$ ); however, the data for a convenience sample were used due to archival data.

Creswell (2008) stated that quantitative research is essentially about collecting numerical data to explain a particular phenomenon. This study utilized a causal comparative research design. The researcher obtained existing data and examined the research questions of difference in reading and mathematics growth indexes on the North Carolina EOG tests between students being taught by NBC teachers and non-NBC teachers in Title I schools.

**Causal comparative design.** A causal comparative design is a quantitative research design that seeks to find relationships between independent and dependent variables after an action or event has already occurred using measurable data. These data can be dissected and evaluated for evidence of significant differences in teacher growth indexes. The formula used to arrive at the teacher's growth index was growth measure/standard error. The researcher's goal was to determine whether the independent variable affected the outcome, or dependent variable, by comparing two groups of individuals. NBC teacher data were collected and compared with non-NBC teacher data from the ABC School District.

A minimum of 4 years of experience was part of the criteria for NBPTS eligibility for the certification requirements. The 89 core elementary teachers were compared based

on (a) years of experience, (b) grade level, and (c) certification.

### **Instrumentation**

The researcher obtained archival data from the school district's EVAAS. EVAAS is a customized software system available to all North Carolina school districts. EVAAS provides North Carolina educators with tools to improve student learning and to reflect and improve on their own effectiveness. The school district in the study used EVAAS to store results from the EOG standardized tests for Grades 3-5. The data consisted of NBC and non-NBC teacher growth measure, standard error, growth index, and effectiveness levels in the areas of reading and mathematics during the academic school year 2015-2016.

### **Reliability**

Creswell (2014) stated, "reliability refers to where scores to items on an instrument are internally consistent stable over time, and whether there was consistency in test administration and scoring" (p. 247). The internal consistency coefficient is the statistic used to quantify reliability for the EOG tests in reading and mathematics.

Internal consistency reliability estimates examine the extent to which items on a test are related. One procedure for determining the internal consistency of test is coefficient alpha. Coefficient alpha estimates reliability of test scores constructed in terms of the domain sampling model. Test scores must be reliable if any valid inferences are made on examinee performances. The North Carolina Statewide Testing Program meets or exceeds industry norms for reliability. Appendix E interprets the measures of internal consistency as calculated by Cronbach Coefficient Alpha for EOG reading and mathematics.

EVAAS is a fair, reliable, and robust approach; and the models were reviewed



and validated by WestEd Review, RAND publications, and Government Accountability Office and four United States Department of Education peer review committees.

WestED (2012) claimed student growth estimates that emerge can be used in conjunction with other types of information to yield fair, valid, and reliable estimates of teacher instructional effectiveness.

### **Validity**

According to Creswell (2014), “validity in quantitative research refers to whether one can draw meaningful and useful inferences from scores on particular instrument” (p 250). For the archival data collected, the researcher’s intent was to compare the growth index of the NBC teachers and the non-NBC teachers in the Title I elementary schools and compare the subject areas of reading and math in Grades 3-5. These North Carolina EOG tests have been recognized as valid and reliable in measuring the components as utilized in this study; however, in this study, the validity was dependent upon the EVAAS archival data from 2015-2016.

### **Procedures**

The researcher emailed the program coordinator at NCDPI and requested a listing of NBC teachers in the ABC School District. The program coordinator forwarded the researcher’s email to the School Business Division and Financial Analysis and Reporting. To conduct research in the ABC School District, the researcher completed and submitted an application to do research. The ABC School District approved the researcher to conduct research related to the 2015-2016 academic school year. In addition to a list of NBC teachers, EVAAS data were collected from the district office. The district office provided aggregated data for NBC teachers and non-NBC teachers in Grades 3-5 in elementary Title I and non-Title I schools. Data were gathered in a way that protected

the integrity of the teacher and student. Anonymity was assured using codes (i.e., Teacher 1) and pseudonyms (i.e., ABC School District). The collected data were organized, displayed, and analyzed using growth indexes associated with the North Carolina EOG test and reported in teacher EVAAS data. After the data were aggregated, growth indexes and achievement scores were used to distinguish scores for each teacher in the two distinctive groups. Total average mean scores were calculated and compared between groups to draw conclusions about teacher effectiveness and student achievement specific to the research questions for this study. These data served as the sole measure of student achievement growth for each group of teachers. The data were classified according to NBC teachers and non-NBC teachers.

### **Data Collection**

Data for this study were collected through archival data exclusively through EOG scores in reading and math as reported in EVAAS. Archival data were reviewed as they pertained to student test scores for a year using previously reported EOG data compiled and reported by the school district for the 2015-2016 academic school year. Archival data were provided by the ABC School District.

### **Confidentiality**

Although no contact was required with the teachers in the sample population or the students whose EOG scores were addressed in the study, all information was handled with the highest confidentiality. Any hard copies of information collected at the research site were stored in a secure location during the time the information was used by the researcher. The chief officer of research and evaluation of the ABC School District emailed the researcher an Excel document with teacher's school, years of experience, NBC and non-NBC teacher, teacher grade level, and reading and math teacher index

scores from 2015-2016 academic school year. The workbook within an Excel document provided data from Title I and non-Title I schools, teacher years of experience, NBC and non-NBC teachers, grade level, and reading and math teacher growth indexes. Data from the EOG tests were reported for the 2015-2016 school years. Test results, data, and general information were available through EVAAS via the Internet.

### **Data Analysis**

The teacher growth-index data from 89 core elementary teachers who had taught in the ABC School District during 2015-2016 school year were compared to determine if a relationship existed between NBC teachers and student achievement. The data included the growth measure, standard error, index, and level from the 2015-2016 spring administration of the North Carolina EOG tests in reading and mathematics at the 3-5 grade levels. The developmental scale scores at 3-5 grade levels were converted into achievement levels and used the criteria set forth by NCDPI and EVAAS. Data were collected and analyzed using EVAAS archival data from the academic school year 2015-2016 for students in Grades 3-5. The researcher used the EVAAS data to compare NBC and non-NBC growth indexes. NBC and non-NBC teacher growth indexes collected were divided into two groups, Grades 3-5 reading and Grades 3-5 mathematics. The data were analyzed using SPSS to determine if a statistically significant difference between the independent variable affected the outcome, or dependent variable, by comparing NBC teachers and non-NBC teachers.

The sample consisted of 41 NBC core elementary and 48 non-NBC teachers working in the ABC School District. Results, findings, and conclusions for this study were based on teacher EVAAS data in Grades 3-5 in a local school district in central North Carolina. There were 28 elementary Title I schools identified in this particular

district. Based on additional data obtained, there were 41 core teachers who reported certification through the National Board process in 2015-2016. These 41 core teachers were used as the basis for this study. The NBC teachers were in 15 schools in the ABC School District. In addition, 48 core teachers who are not certified by the National Board process were also used as a comparison group to establish effectiveness (or lack thereof) of board certification on student achievement.

The researcher used an independent sample  $t$  test to determine if there was a statistically significant difference in reading and mathematics growth indexes on the North Carolina EOG assessments between students in the overall, Title I, and non-Title school samples taught by NBC teachers and non-NBC teachers. SPSS was appropriate for this study because it is used to compare means, median, and mode between groups.

In this study, the independent variable was teacher status as NBC. The treatment group for this study was students of teachers who are NBC; the control group was students of teachers who are not NBC. Student achievement was measured by teacher growth indexes on the North Carolina EOG assessment for reading and math during one school term for each participating teacher in this study. The dependent variable was the North Carolina EOG reading and mathematics growth measure and index; independent variables were the Title I schools and teacher certification as being NBC or non-NBC; the covariates were North Carolina EOG reading and mathematics growth measure and index. Statistical analysis for the research questions was performed using an independent sample  $t$  test.

### **Limitations**

The research study had limitations, including a smaller number of NBC teachers who taught Grades 3-5 than non-NBC teachers who taught Grades 3-5. The population

consisted of 41 core elementary NBC teachers and 48 core elementary non-NBC teachers who taught Grades 3-5. Another limitation of this study was due to using participants who have taught grouped by three categories: 4-10 years, 11-20 years, and 21-30 years. Originally, 25 NBC and 25 non-NBC teachers were part of the research. This limitation was due to the amount of teacher index data that were provided from the district. The number of NBC and non-NBC teacher index data varied from participants of 89 throughout the elementary school part of the district.

### **Delimitations**

The findings of the study has implications and relevance for one school district in North Carolina. Within these parameters, the study findings can be generalized to the sample population of teachers in this school district. The data were collected and limited from various schools throughout the ABC School District. The study focused on one academic school year, 2015-2016. The study's participants were limited to convenience sampling by school. The participants were teachers who taught in Grades 3-5 public schools in the ABC School District.

### **Summary**

This chapter included a description of the study design, sample population, instrumentation, setting, data collection, and data analysis processes and procedures used in the implementation of this quantitative study. The purpose of this study was to investigate the impact NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. This study explored the impact of National Board Certification in the ABC School District on the achievement of students in Grades 3-5. The methodology used by the researcher allowed her to explore the following

research questions.

1. For students in Grades 3-5 in Title I schools, what was the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests?
2. For students in Grades 3-5 in Title I schools, what was the relationship of teacher math growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG math tests?

If differences between National Board Certification and student achievement were established through the research, findings could be reported to state and local officials in an effort to encourage more support for future National Board Certification candidates (Singleton, 2010).

Chapter 4 contains the results of the data collected and analyzed using SPSS to determine whether differences exist between the two groups under study. Discussion of data collection procedures appear in Chapter 4, and the results of the study are tables.

## **Chapter 4: Results**

### **Introduction**

The purpose of this study was to investigate the impact NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. According to a report issued by NBPTS (2008), “42% of the nation’s NBCTs were teaching in schools eligible for Title I funding” where poverty and teacher turnover rates are at high levels, creating risk factors that promote student academic failure (Center for Educator Recruitment, Retention and Advancement, 2010, p. 4).

This study was to determine the impact of National Board Certification on student achievement in the core areas of reading and math using independent groups. Specifically, the study addressed two research questions. First, “for students in Grades 3-5 in Title I schools, what was the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests?” Second, “for students in Grades 3-5 in Title I schools, what was the relationship of teacher math growth indexes between students taught by NBC teacher and student taught by teachers who were not NBC teachers and student taught by teachers who were not NBC as measured by North Carolina EOG math tests?”

The research office at the school district provided 2016 archival data for this study that included both Title I and non-Title I schools. The sample provided included math and reading growth-index scores, LEA identifiers, teacher years of experience, grade level, and National Board Certification data. The purpose of this chapter is to summarize the findings of the study in terms of the two research questions. The chapter

is divided into three major sections: overall data results, Title I data results, and non-Title I data results.

### **Data Analysis**

The data were examined to identify any imperfection that might exist. It was determined that disaggregation of the data in some areas due to missing data or sample sizes being extremely small would lead to imprecise results. These imperfections are identified when the results are presented.

### **Overall Sample**

Teacher effectiveness was measured using teacher mean reading and math EOG growth indexes; therefore, participants who taught either reading or math were subjects in the study. The data collected for the overall teacher participants from the school district represented 89 core teacher participants. Table 2 presents the number of NBC teachers by Title I designation.

Table 2

*Participants with National Board Certification by Title I Designation*

		NBC				
		No		Yes		Total
		N	Percent	N	Percent	N
Title I School	No	26	50.00%	26	50.00%	52
	Yes	22	59.46%	15	40.54%	37
	Total	48	53.93%	41	46.07%	89

Of the 89 core teacher participants, n=48 (53.93%) were non-NBC teachers and n=41 (46.07%) were NBC teachers. Table 3 shows the grade-level data by National Board Certification.



Table 3

*Participants with National Board Certification by Grade Level*

		NBC				
		No		Yes		Total
		N	Percent	N	Percent	N
Grade Level	3	21	63.64%	12	36.36%	33
	4	14	42.42%	19	57.58%	33
	5	13	56.52%	10	43.48%	23
	Total	48	53.93%	41	46.07%	89

Both the third and fourth grades had 33 teachers as participants. The fifth grade had only 23 participants. The fourth grade had the highest representation of the NBC teacher population with 19 of 41 (46.34%) of the participants. Table 4 presents the teacher data of National Board Certification by years of experience.

Table 4

*Participants with National Board Certification by Years of Experience*

		NBC				
		No		Yes		Total
		N	Percent	N	Percent	N
Years of Experience- Grouped	<=10 Years	16	88.89%	2	11.11%	18
	11 - 20 Years	19	44.19%	24	55.81%	43
	21 - 30 Years	11	45.83%	13	54.17%	24
	>30 Years	2	50.00%	2	50.00%	4
	Total	48	53.93%	41	46.07%	89

The data in Table 4 showed that only 41 of the 89 participants (46.07%) have National Board Certification. The data revealed that 65 of the 89 participants (73.03%) have between 11 and 30 years of experience. Thirty-seven of 41 (90.24%) of the teachers with National Board Certification had between 11 and 30 years of experience. The data also revealed that comparative analysis of National Board Certification for participants with 10 years or less experience or 31 years or more experience would not provide results that could be trusted due to either a large difference in the N value or an extremely small

number of participants in the years of experience category.

The following analyses used the entire data sample in order to determine if the comparisons match or differ from the Title I subset and the non-Title I subset. Tables 5 and 6 provide the data from an independent sample  $t$  test to determine if there was a difference in mean reading indexes between NBC and non-NBC teachers.

Table 5

*Overall Sample Reading Index Group Statistics*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	41	-.06976	.936375	.146237
	No	48	-.34354	1.117673	.161322

The data indicated that both independent groups had a negative reading growth index. NBC teachers had a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the  $t$  test are below.

Table 6

*Overall Sample Independent Samples Test*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	2.725	.102	1.240	87	.218
	Equal variances not assumed			1.257	86.973	.212

The results of Levene's Test for Equality of Variance ( $F=2.725, p=.102$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(87)=1.240, p=.218$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.3$ , indicating a small effect size. Tables 7 and 8 provide the data from an independent sample  $t$  test to

determine if there was a difference in mean math indexes between NBC and non-NBC teachers. The results of the  $t$  test are shown in Table 7.

Table 7

*Overall Sample Math Index Group Statistics*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Math Index	Yes	26	.79462	1.532899	.300626
	No	25	-.27560	1.662674	.332535

The data indicated NBC teachers had a positive math growth index and non-NBC teachers had a negative math growth index. The data indicated a higher math growth-index mean for NBC teachers compared to non-NBC teachers. The results of the  $t$  test are shown in Table 8.

Table 8

*Overall Independent Samples Test*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Math Index	Equal variances assumed	.182	.672	2.391	49	.021
	Equal variances not assumed			2.387	48.293	.021

The results of Levene's Test for Equality of Variance ( $F=.182, p=.672$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(49)=2.391, p=.021$ ) indicated a significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.7$ , indicating a medium effect size.

The next section disaggregated the overall data by grade level and years of

experience. Table 9 presents the descriptive statistics for both reading and math.

Table 9

*Overall Sample Reading and Math Index Means and Standard Deviations by Grade Level*

			NBC			
			No		Yes	
			Mean	Standard Deviation	Mean	Standard Deviation
Grade Level	3	Reading Index	-.036	1.145	-.198	.991
		Math Index	.130	.	.	.
	4	Reading Index	-.413	1.247	.187	1.009
		Math Index	.377	1.574	.823	1.821
	5	Reading Index	-.765	.812	-.403	.613
		Math Index	-1.084	1.541	.741	.839

The data indicated that no data were included for third-grade math, even though there are 12 NBC teachers in the data provided by the district.

The following analyses provide the results for Grades 3-5 reading indexes utilized independent sample  $t$  tests to determine if there are significant mean differences between NBC teachers and non-NBC teachers. The data were isolated by grade level.

Table 10

*Overall Sample Reading Index Group Statistics for Grade 3*

					Std. Error
	NBC	N	Mean	Std. Deviation	Mean
Reading Index	Yes	12	-.19833	.991425	.286200
	No	21	-.03619	1.144825	.249821

The data indicated that NBC and non-NBC teachers both had a negative reading growth-index mean. The data indicated a higher reading growth-index mean for non-NBC teachers compared to NBC teachers. The results of the  $t$  test are shown in Table 11.

Table 11

*Overall Independent Samples Test for Reading Grade 3*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.751	.393	-.410	31	.685
	Equal variances not assumed			-.427	25.884	.673

The results of Levene's Test for Equality of Variance ( $F=.751, p=.393$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(31)=-.410, p=.685$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers; however, the  $t$  value of  $-.410$  indicated that the non-NBC reading index mean was higher compared to the NBC index mean. Computing Cohen's  $d$  effect size yields a  $d=0.15$ , indicating a very small effect size. Tables 12 and 13 provide the results of independent sample  $t$  tests for reading Grade 4.

Table 12

*Overall Sample Reading Index Group Statistics for Grade 4*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	19	.18684	1.008845	.231445
	No	14	-.41286	1.247166	.333319

The data indicated a positive reading growth index for NBC teachers and a negative reading growth index for non-NBC teachers. The data indicated a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the  $t$  test are shown in Table 13.

Table 13

*Overall Independent Samples Test for Reading Grade 4*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.683	.415	1.527	31	.137
	Equal variances not assumed			1.478	24.452	.152

The results of Levene's Test for Equality of Variance ( $F=.683$ ,  $p=.415$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(31)=1.527$ ,  $p=.137$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.5$ , indicating a medium effect size. Tables 14 and 15 provide the results of independent sample  $t$  tests for reading Grade 5.

Table 14

*Overall Sample Reading Index Group Statistics for Grade 5*

		N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	10	-.40300	.612827	.193793
	No	13	-.76538	.812133	.225245

The data indicated that NBC and non-NBC teachers both had a negative reading growth index. The data show a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the  $t$  test are shown in Table 15.

Table 15

*Overall Independent Samples Test for Reading Grade 5*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	1.140	.298	1.175	21	.253
	Equal variances not assumed			1.220	20.999	.236

The results of Levene's Test for Equality of Variance ( $F=1.140$ ,  $p=.298$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(21)=1.175$ ,  $p=.253$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.5$ , indicating a medium effect size.

The following analyses provide the data results comparing math mean indexes by National Board Certification designation. These analyses were isolated by grade level. Due to lack of data in the sample, a Grade 3 math index comparison was not attempted. Tables 16 and 17 provide the results for Grade 4.

Table 16

*Overall Sample Math Index Group Statistics for Grade 4*

		N	Mean	Std. Deviation	Std. Error Mean
Math Index	NBC Yes	17	.82294	1.821307	.441732
	No	13	.37692	1.573523	.436417

The data indicated that both groups experienced a positive growth index. NBC teachers had a higher math growth index compared to non-NBC teachers.

Table 17

*Overall Independent Samples Test for Math Grade 4*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Math Index	Equal variances assumed	.613	.440	.704	28	.487
	Equal variances not assumed			.718	27.520	.479

The results of Levene's Test for Equality of Variance ( $F=.613, p=.440$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(28)=.704, p=.487$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.3$ , indicating a small effect size. Tables 18 and 19 provide the results for Grade 5.

Table 18

*Overall Sample Math Group Statistics for Grade 5*

		N	Mean	Std. Deviation	Std. Error Mean
Math Index	NBC Yes	9	.74111	.838935	.279645
	No	11	-1.08364	1.541235	.464700

The data indicated that NBC teachers had a positive growth index compared to a negative growth index for non-NBC teachers. The results of the *t* test are shown in Table 19.



Table 19

*Overall Independent Samples Test for Math Grade 5*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Math Index	Equal variances assumed	1.661	.214	3.177	18	.005
	Equal variances not assumed			3.364	15.941	.004

The results of Levene's Test for Equality of Variance ( $F=1.661, p=.214$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(18)=3.177, p=.005$ ) indicated a significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d>1.53$ , indicating a mean difference greater than 1.53 standard deviations.

The analyses in this section focused on teacher years of experience. The data were isolated for each experience group with sufficient NBC and non-NBC teachers to analyze. The data presented in Table 3 indicated that the experience group  $\leq 10$  years had 18 participants with only two having National Board Certification. This would not provide adequate numbers for meaningful analysis. In the experience group  $>30$  years, only four teachers were in that group total. The following analyses focused on groups 11-20 years and 21-30 years. Tables 20 and 21 present the data for experience group 11-20 years for both reading and math.

Table 20

*Overall Sample Reading Index and Math Index Group Statistics for Teacher Experience Group 11-20 years*

NBC		N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	24	.03250	.871257	.177845
	No	19	-.10947	1.148963	.263590
Math Index	Yes	14	1.13429	1.682218	.449592
	No	7	-.69714	1.913040	.723061

Both the reading and math growth-index means indicated that NBC teachers had a positive growth index and non-NBC teachers had a negative growth index. The results of the  $t$  test are shown in Table 21.

Table 21

*Overall Reading and Math Independent Samples Test for Teacher Experience Group 11-20 Years*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	1.665	.204	.461	41	.647
	Equal variances not assumed			.446	32.799	.658
Math Index	Equal variances assumed	.199	.660	2.250	19	.036
	Equal variances not assumed			2.151	10.792	.055

**Reading.** The results of Levene's Test for Equality of Variance ( $F=1.665$ ,  $p=.204$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(41)=.461$ ,  $p=.647$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=.14$ , indicating a very small effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=.199$ ,  $p=.660$ )

indicated that equal variance can be assumed. The results of the  $t$  test ( $t(19)=2.250$ ,  $p=.036$ ) indicated a significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=1.02$ , indicating a large effect size with a mean difference greater than one standard deviation. Tables 22 and 23 present the data for experience group 21-30 years.

Table 22

*Overall Sample Reading Index and Math Index Group Statistics for Teacher Experience Group 21-30 Years*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	13	.06846	.928043	.257393
	No	11	-.58545	1.017609	.306821
Math Index	Yes	8	.76875	.873718	.308906
	No	8	-.17000	1.571651	.555662

For teachers with 21-30 years of experience, both reading and math indexes were positive for NBC teachers and negative for non-NBC teachers.

Table 23

*Overall Reading and Math Independent Samples Test for Teacher Experience Group 21-30 Years*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.320	.577	1.646	22	.114
	Equal variances not assumed			1.633	20.547	.118
Math Index	Equal variances assumed	1.553	.233	1.477	14	.162
	Equal variances not assumed			1.477	10.949	.168

**Reading.** The results of Levene's Test for Equality of Variance ( $F=.320, p=.577$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(22)=1.477, p=.114$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.6$ , indicating a medium effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=1.477, p=.233$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(14)=1.250, p=.162$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.7$ , indicating a large effect size.

### **Title I Sample**

The following analyses were based on a sample representing only Title I schools. This sample had a total of 37 participants. Table 8 showed the breakdown of teachers in the sample at each Title I school with or without National Board Certification.

Table 24

*Title I Teacher National Board Certification by School*

		NBC		Total
		No	Yes	
School	A	2	1	3
	B	1	2	3
	BB	1	1	2
	G	0	1	1
	I	1	0	1
	J	1	0	1
	K	2	1	3
	M	2	1	3
	N	1	1	2
	Q	3	2	5
	R	3	0	3
	T	1	2	3
	X	1	0	1
	Y	0	1	1
	Z	3	2	5
Total		22	15	37

The data presented showed the number of NBC and non-NBC teachers in the elementary Title I schools. Twenty-two (59.5%) of the teachers who taught in the Title I schools were non-NBC and 15 (40.5%) of the teachers were NBC.

In Table 25, teacher participant data were disaggregated by grade level for the Title I schools. Of the 37 teachers, 14 (37.8%) of the teachers taught Grade 3, 13 (35.1%) of the teachers taught Grade 4, and 10 (27%) of the teachers taught Grade 5.

Table 25

*Title I Participants with National Board Certification by Grade Level*

		NBC				
		No		Yes		Total
		N	Percent	N	Percent	N
Grade Level	3	10	71.43%	4	28.57%	14
	4	7	53.85%	6	46.15%	13
	5	5	50.00%	5	50.00%	10
	Total	22	59.46%	15	40.54%	37

The third grade had the highest representation of non-NBC teacher population with 10 of 22 (45.45%). The fourth grade had the highest representation of NBC teacher population with six of 15 (40.00%). In this participant sample, the highest representation was non-NBC with 22 of 37 (59.46%). Of the Title I participants, 15 of 37 (40.54%) were NBC. Table 26 presents the Title I participants with National Board Certification by years of experience.

Table 26

*Title I Participants with National Board Certification by Years of Experience*

		NBC				
		No		Yes		Total
		N	Percent	N	Percent	N
	<=10 Years	7	100.00%	0	0.00%	7
	11 - 20 Years	11	55.00%	9	45.00%	20
	21 - 30 Years	3	37.50%	5	62.50%	8
	>30 Years	1	50.00%	1	50.00%	2
	Total	22	59.46%	15	40.54%	37

The data in Table 26 showed that only 15 of the 37 participants (40.54%) had National Board Certification. The data revealed that 28 of the 37 participants (75.66%) had between 11 and 30 years of experience. Fourteen of the 37 (37.84%) teachers with National Board Certification had between 11 and 30 years of experience. The data also revealed that comparative analysis of National Board Certification for participants with

10 years or less or 31 years or more experience would not provide results that could be trusted due to either a large difference in the N value or an extremely small number of participants in the years of experience category.

The following analyses used Title I data samples in order to determine if the comparisons match or differ from overall subset and non-Title I subset. Tables 27 and 28 provide the data from an independent sample *t* test to determine if there is a difference in mean reading indexes between NBC and non-NBC teachers.

Table 27

*Title I Sample Reading Index Group Statistics*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	15	.01667	.831227	.214622
	No	22	-.40182	1.327750	.283077

The data indicated a positive reading growth index for NBC teachers and a negative reading growth index for non-NBC teachers. The data indicated a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the *t* test are shown in Table 28.

Table 28

*Title I Independent Samples Test for NBC*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	6.058	.019	1.082	35	.287
	Equal variances not assumed			1.178	34.822	.247

The results of Levene's Test for Equality of Variance ( $F=6.058$ ,  $p=0.19$ ) indicated equal variance cannot be assumed. The results of the *t* test ( $t(34.822)=1.178$ ,  $p=.247$ )

indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.4$ , indicating a small effect size. Tables 29 and 30 provide the data from an independent sample  $t$  test to determine if there is a difference in mean math indexes between NBC and non-NBC teachers.

Table 29

*Title I Sample Math Index Group Statistics*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Math Index	Yes	10	.33600	.909141	.287496
	No	11	-.81091	1.812476	.546482

The data indicated a positive math growth index for NBC teachers and a negative math growth index for non-NBC teachers. The data show a higher math growth-index mean for NBC teachers compared to non-NBC teachers. The results of the  $t$  test are shown in Table 30.

Table 30

*Title I Independent Samples Test for NBC*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
Math Index	Equal variances assumed	5.580	.029	1.803	19	.087
	Equal variances not assumed			1.857	15.203	.083

The results of Levene's Test for Equality of Variance ( $F=5.580$ ,  $p=.029$ ) indicated



equal variance cannot be assumed. The results of the  $t$  test ( $t(15.203)=1.857, p=.083$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.8$ , indicating a large effect size.

The next section disaggregated the Title I data by grade level and years of experience. Table 31 presents the descriptive statistics for both reading and math.

Table 31

*Title I Sample Reading and Math Index Means and Standard Deviations by Grade Level*

			NBC			
			No		Yes	
			Mean	Standard Deviation	Mean	Standard Deviation
Grade Level	3	Reading Index	-.214	1.452	-.022	1.135
		Math Index	.	.	.	.
	4	Reading Index	-.311	1.446	.108	1.024
		Math Index	.123	1.891	.823	1.821
	5	Reading Index	-.904	.980	-1.932	.928
		Math Index	-.062	.345	.444	.796

The data indicated no data were included for third-grade math, even though there are 14 teachers (10 non-NBC and four NBC) in the data provided by the district.

The following analyses used Title I data samples in order to determine if comparisons match or differ from the overall subset and non-Title I subset. Tables 32 and 33 provide the data from an independent sample  $t$  tests to determine if there are significant mean differences between NBC teachers and non-NBC teachers. The data were isolated by grade level. Table 32 presents the data for Grade 3 in reading.

Table 32

*Title I Sample Reading Index Group Statistics for Grade 3*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	4	-.02250	1.135323	.567662
	No	10	-.21400	1.451920	.459137

The data indicated that both independent groups had a negative reading growth index. The data show a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the *t* test are shown in Table 33.

Table 33

*Title I Independent Samples Test for Reading Grade 3*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	1.558	.236	.235	12	.818
	Equal variances not assumed			.262	7.184	.800

The results of Levene's Test for Equality of Variance ( $F=1.558, p=.236$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(12)=.235, p=.818$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.15$ , indicating a very small effect size. Tables 34 and 35 provide the results of independent sample *t* tests for reading Grade 4.

Table 34

*Title I Sample Reading Index Group Statistics for Grade 4*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	6	.10833	1.024000	.418046
	No	7	-.31143	1.445596	.546384

The data indicated a positive reading growth index for NBC teachers and negative reading growth index for non-NBC teachers. The data show a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the *t* test are shown in Table 35.

Table 35

*Title I Independent Samples Test for Reading Grade 4*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.548	.475	.593	11	.565
	Equal variances not assumed			.610	10.686	.555

The results of Levene's Test for Equality of Variance ( $F=.548$ ,  $p=.475$ ) indicated equal variance can be assumed. The results of the *t* test ( $t(11)=.593$ ,  $p=.565$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.3$ , indicating a small effect size. Tables 36 and 37 provide the results of independent sample *t* tests for reading Grade 5.

Table 36

*Title I Sample Reading Index Group Statistics for Grade 5*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	5	-.06200	.344920	.154253
	No	5	-.90400	.979709	.438139

The data indicated both independent groups had a negative reading growth index. The data show a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the *t* test are shown in Table 37.

Table 37

*Title I Independent Samples Test for Reading Grade 5*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	10.910	.011	1.813	8	.107
	Equal variances not assumed			1.813	4.977	.130

The results of Levene's Test for Equality of Variance ( $F=10.910$ ,  $p=.011$ ) indicated that equal variance cannot be assumed. The results of the *t* test ( $t(4.977)=1.813$ ,  $p=.130$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.5$ , indicating a medium effect size.

The following analyses provide the data results comparing math mean indexes by National Board Certification designation. These analyses were isolated by grade level. Due to lack of data provided from the source for Grade 3 in the sample, a math index comparison was not attempted. Tables 38 and 39 provide the results for Grade 4.

Table 38

*Title I Sample Math Index Group Statistics for Grade 4*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Math Index	Yes	5	.22800	1.093947	.489228
	No	6	.12333	1.891123	.772048

The data indicated that both independent groups had a positive math growth index. The data show that NBC teachers had a higher math growth index compared to non-NBC teachers.

Table 39

*Title I Independent Samples Test for Math Grade 4*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
Math Index	Equal variances assumed	.428	.529	.109	9	.916
	Equal variances not assumed			.115	8.174	.912

The results of Levene's Test for Equality of Variance ( $F=.428$ ,  $p=.529$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(9)=.109$ ,  $p=.916$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.07$ , indicating a small effect size. Tables 40 and 41 provide the results for Grade 5.

Table 40

*Title I Sample Math Group Statistics for Grade 5*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Math	Yes	5	.44400	.796134	.356042
Index	No	5	-1.93200	.928423	.415204

The data indicated that NBC teachers had a positive growth index compared to a negative growth index for non-NBC teachers. The data show that NBC teachers have a higher growth index compared to non-NBC teachers. The results of the  $t$  test are shown in Table 41.

Table 41

*Title I Sample Independent Samples Test for Math Grade 5*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Math	Equal variances	.004	.952	4.344	8	.002
Index	assumed					
	Equal variances not assumed			4.344	7.818	.003

The results of Levene's Test for Equality of Variance ( $F=.004$ ,  $p=.952$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(8)=4.344$ ,  $p=.002$ ) indicated a significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d>2.37$ , indicating a mean difference greater than 2.37 standard deviations.

The analyses in this section focused on teacher years of experience. The data were isolated for each experience group with sufficient NBC and non-NBC teachers to analyze. The data presented in Table 3 indicate that the experience group  $\leq 10$  years has

18 participants with only two having National Board Certification. This would not have provided adequate numbers for meaningful analysis. In the experience group >30 years, only four teachers were in that group. The following analyses focused on groups 11-20 years and 21-30 years. Tables 42 and 43 present the data for experience group 11-20 years for both reading and math.

Table 42

*Title I Sample Reading Index and Math Index Group Statistics for Teacher Experience Group 11-20 Years*

NBC		N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	9	-.04444	.686041	.228680
	No	11	-.18818	1.280748	.386160
Math Index	Yes	6	.10333	1.023888	.418001
	No	5	-1.42800	1.596142	.713817

Reading index means for NBC and non-NBC teachers had a negative growth index. Math index means show that NBC teachers had a positive growth index and non-NBC teachers had a negative growth index.

Table 43

*Title I Reading and Math Independent Samples Test for Teacher Experience Group 11-20 Years*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	2.518	.130	.302	18	.766
	Equal variances not assumed			.320	15.813	.753
Math Index	Equal variances assumed	3.110	.112	1.931	9	.086
	Equal variances not assumed			1.851	6.593	.109

**Reading.** The results of Levene's Test for Equality of Variance ( $F=2.518$ ,  $p=.130$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(18)=.302$ ,  $p=.766$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=.14$ , indicating a very small effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=3.110$ ,  $p=.130$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(9)=1.931$ ,  $p=.086$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=1.14$ , indicating a large effect size with a mean difference greater than one standard deviation. Tables 44 and 45 present the data for experience group 21-30 years.



Table 44

*Title I Sample Reading Index and Math Index Group Statistics for Teacher Experience Group 21-30 Years*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	5	.22400	1.164315	.520698
	No	3	-.52000	1.284212	.741440
Math Index	Yes	3	.54333	.756395	.436705
	No	2	-.40000	2.163747	1.530000

For teachers with 21-30 years of experience, both reading and math indexes were positive for NBC teachers and negative for non-NBC teachers.

Table 45

*Title I Reading and Math Independent Samples Test for Teacher Experience Group 21-30 Years*

		Levene's Test for Equality of Variances		t test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.122	.739	.845	6	.430
	Equal variances not assumed			.821	3.976	.458
Math Index	Equal variances assumed	25.399	.015	.742	3	.512
	Equal variances not assumed			.593	1.166	.648

**Reading.** The results of Levene's Test for Equality of Variance ( $F=.122, p=.739$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(6)=.845, p=.430$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=.6$ , indicating a medium

effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=25.399, p=.015$ ) indicated that equal variance cannot be assumed. The results of the  $t$  test ( $t(1.166)=-.593, p=.648$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=.7$ , indicating a large effect size.

### Non-Title I Sample

The data collected for teacher participants from the school district represented teacher participants from non-Title I schools. The following analyses use the non-Title I sample in order to determine if the comparisons match or differ from the overall subset and the Title I subset. Tables 46 and 47 provide data from an independent sample  $t$  test to determine if there is a difference in mean reading indexes between NBC and non-NBC teachers.

Table 46

*Non-Title I Reading Index Group Statistics*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	26	-.11962	1.004432	.196985
	No	26	-.29423	.928501	.182094

The data indicated that both NBC and non-NBC teachers had a negative reading growth index. The data show a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The results of the  $t$  test are shown in Table 47.

Table 47

*Non-Title I Independent Samples Test*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2- tailed)
Reading Index	Equal variances assumed	.055	.816	.651	50	.518
	Equal variances not assumed			.651	49.694	.518

The results of Levene's Test for Equality of Variance ( $F=.055, p=.816$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(50)=.651, p=.518$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.2$ , indicating a small effect size. Tables 48 and 49 provide the data from an independent sample *t* test to determine if there is a difference in mean math indexes between NBC and non-NBC teachers.

Table 48

*Non-Title I Math Index Group Statistics*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Math Index	Yes	16	1.08125	1.786762	.446690
	No	14	.14500	1.464139	.391308

The data indicated both NBC and non-NBC teachers had a positive math growth index. The data show a higher math growth-index mean for NBC teachers compared to non-NBC teachers. The results of the *t* test are shown in Table 49.

Table 49

*Non-Title I Independent Samples Test*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
Math Index	Equal variances assumed	.055	.464	1.555	28	.131
	Equal variances not assumed			1.577	27.898	.126

The results of Levene's Test for Equality of Variance ( $F=.055$ ,  $p=.464$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(28)=1.555$ ,  $p=.131$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.6$ , indicating a medium effect size.

The following analyses used non-Title I data samples in order to determine if the comparisons match or differ from the overall subset and Title I subset. Tables 50-59 provide data from independent sample  $t$  tests to determine if there are mean differences between NBC teachers and non-NBC teachers. The data were isolated by grade level.

Table 50

*Non-Title I Reading Index Group Statistics for Grade 3*

NBC		N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	8	-.28625	.982692	.347434
	No	11	.12545	.814633	.245621

The data indicated a positive reading growth index with non-NBC teachers and a negative reading growth index for NBC teachers. The data show a higher reading growth-index mean for non-NBC teachers compared to NBC teachers. The results of the

$t$  test are shown in Table 51.

Table 51

*Non-Title I Independent Samples Test for Reading Grade 3*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2- tailed)
Reading Index	Equal variances assumed	.299	.592	-.998	17	.332
	Equal variances not assumed			-.968	13.402	.350

The results of Levene's Test for Equality of Variance ( $F=.299, p=.592$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(17)=-.998, p=.332$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.15$ , indicating a very small effect size. Tables 52 and 53 provide the results of independent sample  $t$  tests for reading Grade 4.

Table 52

*Non-Title I Reading Index Group Statistics for Grade 4*

		NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes		13	.22308	1.041748	.288929
	No		7	-.51429	1.120861	.423646

The data indicated that NBC teachers have a positive reading growth index and non-NBC teachers have a negative reading growth index. The data show a higher reading growth-index mean for NBC teachers compared to non-NBC teachers. The

results of the  $t$  test are shown in Table 53.

Table 53

*Non-Title I Independent Samples Test for Reading Grade 4*

		Levene's Test for Equality of Variances		$t$ test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.029	.866	1.472	18	.158
	Equal variances not assumed			1.438	11.622	.177

The results of Levene's Test for Equality of Variance ( $F=.029, p=.866$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(18)=1.472, p=.158$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.7$ , indicating a medium effect size. Tables 54 and 55 provide the results of independent sample  $t$  tests for reading Grade 5.

Table 54

*Non-Title I Reading Index Group Statistics for Grade 5*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	5	-.74400	.659795	.295069
	No	8	-.67875	.748263	.264551

The data indicated that both independent groups had a negative growth index. The data show a higher reading growth-index mean for non-NBC teachers compared to NBC teachers. The results of the  $t$  test are shown in Table 55.

Table 55

*Non-Title I Independent Samples Test for Reading Grade 5*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.178	.681	-.160	11	.876
	Equal variances not assumed			-.165	9.506	.873

The results of Levene's Test for Equality of Variance ( $F=.178, p=.681$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(11)=-.160, p=.876$ ) indicated no significant difference between the reading mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=0.1$ , indicating a small effect size.

The following analyses provide the data results comparing math mean indexes by National Board Certification designation. These analyses were isolated by grade level. Due to lack of data for Grade 3 in the sample, a math index comparison was not attempted. Tables 56 and 57 provide the results for Grade 4.

Table 56

*Non-Title I Math Index Group Statistics for Grade 4*

		NBC	N	Mean	Std. Deviation	Std. Error Mean
Math Index	Yes		12	1.07083	2.040064	.588916
	No		7	.59429	1.360966	.514397

Both groups experienced a positive growth index. The data indicated that NBC teachers had a higher math growth index compared to non-NBC teachers.

Table 57

*Non-Title I Independent Samples Test for Math Grade 4*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Math Index	Equal variances assumed	1.706	.209	.548	17	.591
	Equal variances not assumed			.609	16.539	.551

The results of Levene's Test for Equality of Variance ( $F=1.706$ ,  $p=.209$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(17)=.548$ ,  $p=.591$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=0.3$ , indicating a small effect size. Tables 58 and 59 provide the results for Grade 5.

Table 58

*Non-Title I Math Group Statistics for Grade 5*

		N	Mean	Std. Deviation	Std. Error Mean
Math Index	Yes	4	1.11250	.837073	.418537
	No	6	-.37667	1.655822	.675987

The data indicated that NBC teachers had a positive growth index compared to a negative growth index for non-NBC teachers. The data show that NBC teachers had a higher growth index compared to non-NBC teachers. The results of the  $t$  test are shown in Table 59.



Table 59

*Non-Title I Independent Samples Test for Math Grade 5*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Math Index	Equal variances assumed	.689	.431	1.641	8	.139
	Equal variances not assumed			1.873	7.686	.099

The results of Levene's Test for Equality of Variance ( $F=.689$ ,  $p=.431$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(8)=1.641$ ,  $p=.139$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d>1.14$ , indicating a mean difference greater than 1.14 standard deviations.

The analyses in this section focused on teacher years of experience. The data were isolated for each experience group with sufficient NBC and non-NBC teachers to analyze. The data presented in Table 3 indicated that the experience group  $\leq 10$  years had 18 participants with only two (11.11%) non-NBC teachers. This would not provide adequate numbers for meaningful analysis. In the experience group  $>30$  years, only four (two NBC and two non-NBC) teachers were in that group. The following analyses focused on groups 4-10 years, 11-20 years, and 21-30 years. Tables 60 and 61 present the data for experience group 4-10 for both reading and math.

Table 60

*Non-Title I Reading Index and Math Index Group Statistics for Teacher Experience Group 4-10 Years*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	2	-1.23000	1.258650	.890000
	No	9	-.23667	.843327	.281109
Math Index	Yes	2	-1.78500	1.223295	.865000
	No	5	.12200	1.621410	.725117

For teachers with 4-10 years of experience, both reading and math indexes were negative for NBC teachers. Non-NBC teachers had a negative growth index for reading and positive growth index for math.

Table 61

*Non-Title I Reading and Math Independent Samples Test for Teacher Experience Group 4-10 Years*

		Levene's Test for Equality of Variances		t test for Equality of Means		
		F	Sig.	T	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.414	.536	-1.413	9	.191
	Equal variances not assumed			-1.064	1.208	.455
Math Index	Equal variances assumed	.286	.616	-1.471	5	.201
	Equal variances not assumed			-1.69-	2.581	.204

**Reading.** The results of Levene's Test for Equality of Variance ( $F=.414$ ,  $p=.536$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(9)=-1.413$ ,  $p=.191$ ) indicated no significant difference between the reading mean index of NBC

teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=.9$ , indicating a large effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=.286, p=.616$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(5)=-1.471, p=.201$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d>1.3$ , indicating a large effect size.

Tables 62 and 63 are analyses for 11-20 years of teacher experience.

Table 62

*Non-Title I Reading Index and Math Index Group Statistics for Teacher Experience Group 11-20 Years*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	15	.07867	.985921	.254564
	No	8	-.00125	1.013980	.358496
Math Index	Yes	8	1.90750	1.706557	.603359
	No	7	1.13000	1.555635	1.100000

Both the reading index means and the math index means show that NBC teachers had a positive growth index. Non-NBC teachers had a negative reading growth index and a positive math growth index.

Table 63

*Non-Title I Reading and Math Independent Samples Test for Teacher Experience Group 11-20 Years*

		Levene's Test for Equality of Variances		<i>t</i> test for Equality of Means		
		F	Sig.	<i>t</i>	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.090	.767	.183	21	.856
	Equal variances not assumed			.182	14.052	.858
Math Index	Equal variances assumed	.208	.661	.582	8	.576
	Equal variances not assumed			.620	1.671	.609

**Reading.** The results of Levene's Test for Equality of Variance ( $F=.090, p=.767$ ) indicated that equal variance can be assumed. The results of the *t* test ( $t(21)=.183, p=.856$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=.1$ , indicating a very small effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=.208, p=.661$ ) indicated equal variance can be assumed. The results of the *t* test ( $t(8)=.582, p=.576$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's *d* effect size yields a  $d=.5$ , indicating a medium effect size with a mean difference greater than one standard deviation. Tables 64 and 65 present the data for experience group 21-30 years.

Table 64

*Non-Title I Reading Index and Math Index Group Statistics for Teacher Experience Group 21-30 Years*

	NBC	N	Mean	Std. Deviation	Std. Error Mean
Reading Index	Yes	8	-.02875	.820809	.290200
	No	8	-.61000	1.002796	.354542
Math Index	Yes	5	.90400	.994424	.444720
	No	6	-.09333	1.579097	.644664

Reading index means had a negative growth index for NBC and non-NBC teachers. Math index means showed that NBC teachers had a positive growth index. Non-NBC teachers had a negative math growth index.

Table 65

*Non-Title I Reading and Math Independent Samples Test for Teacher Experience Group 21-30 Years*

		Levene's Test for Equality of Variances		t test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Reading Index	Equal variances assumed	.166	.690	1.269	14	.225
	Equal variances not assumed			1.269	13.474	.226
Math Index	Equal variances assumed	.297	.599	1.219	9	.254
	Equal variances not assumed			1.219	8.488	.237

**Reading.** The results of Levene's Test for Equality of Variance ( $F=.166, p=.690$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(14)=1.269, p=.225$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=.6$ , indicating a medium effect size.

**Math.** The results of Levene's Test for Equality of Variance ( $F=.297, p=.599$ ) indicated that equal variance can be assumed. The results of the  $t$  test ( $t(9)=1.219, p=.254$ ) indicated no significant difference between the math mean index of NBC teachers and non-NBC teachers. Computing Cohen's  $d$  effect size yields a  $d=.7$ , indicating a large effect size.

### **Summary of Results**

The purpose of this study was to investigate the impact NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. Explicitly, the study addressed two research questions: (a) For students in Grades 3-5 in Title I schools, what is the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests; and (b) For students in Grades 3-5 in Title I schools what is the relationship of teacher math growth indexes between students taught by NBC teacher and student taught by teachers who were not NBC teachers and student taught by teachers who are not NBC as measured by North Carolina EOG math tests?

This chapter presented the results of the statistical analyses from data collected from a school district in North Carolina. Additional analyses were conducted to investigate if other variables were related to teacher growth indexes in math and reading using participants from the overall data sample, participants at Title I data sample, and participants at non-Title I data sample. These variables included participant years of experience, NBC, non-NBC, Title I schools, and non-Title I schools.

Most of the analyses indicate that NBC teacher growth indexes in reading were

higher compared to non-NBC teacher growth indexes. Exceptions to this statement were found in the third grade in the overall sample, third and fifth grade in the non-Title I sample and the <10 years of experience in the non-Title I sample; however, in none of the analyses were the differences significant. Table 66 provides results for reading samples for overall, Title I, and non-Title I schools.

Table 66

*Summary Results for Reading*

			Reading					
Overall Sample			Title I			Non-Title I		
Sample	NBC Higher	Significant	Sample	NBC Higher	Significant	Sample	NBC Higher	Significant
Overall	Y	N	Overall	Y	N	Overall	Y	N
Grade 3	N	N	Grade 3	Y	N	Grade 3	N	N
Grade 4	Y	N	Grade 4	Y	N	Grade 4	Y	N
Grade 5	Y	N	Grade 5	Y	N	Grade 5	N	N
<10 YOE			<10 YOE			<10 YOE	N	N
11-20 YOE	Y	N	11-20 YOE	Y	N	11-20 YOE	Y	N
21-30 YOE	Y	N	21-30 YOE	Y	N	21-30 YOE	Y	N
>30 YOE			>30 YOE			>30 YOE		

*Note.* YOE=years of experience.

With respect to the math growth index, the findings showed that NBC teacher growth indexes were higher compared to non-NBC teacher growth indexes.

Significance was reported in the overall sample without disaggregation and in the disaggregated analyses for Grade 5 and 11-20 years of experience in the overall sample for math. For the overall and Title I samples, significance was reported in the Grade 5 analysis. No significant differences were reported for the non-Title I sample. Table 67

provides results for math samples for overall, Title I, and non-Title I.

Table 67

*Summary Results for Math*

Math								
Overall Sample			Title I			Non-Title I		
Sample	NBC Higher	Significant	Sample	NBC Higher	Significant	Sample	NBC Higher	Significant
Overall	Y	Y	Overall	Y	N	Overall	Y	N
Grade 3			Grade 3			Grade 3		
Grade 4	Y	N	Grade 4	Y	N	Grade 4	Y	N
Grade 5	Y	Y	Grade 5	Y	Y	Grade 5	Y	N
<10 YOE			<10 YOE			<10 YOE	Y	N
11-20 YOE	Y	Y	11-20 YOE	Y	N	11-20 YOE	Y	N
21-30 YOE	Y	N	21-30 YOE	Y	N	21-30 YOE	Y	N

*Note.* YOE=years of experience.

Chapter 4 contained reports of the statistical analyses of the data collected from SPSS software, which was the difference between NBC and non-NBC teachers. The number of participants used for the quantitative causal comparative study was 89 core elementary teachers, and the results appeared in tables. Chapter 5 includes implications and interpretations of findings, limitations, delimitations, suggestions for future research, and conclusions of the study.



## **Chapter 5: Summary, Recommendations, and Conclusions**

### **Summary**

The purpose of this study was to investigate the impact NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVAAS. The findings from archival student achievement data confirmed there was an impact on student learning when teachers have National Board Certification.

This study involved the use of a quantitative research method that addressed the study's goals of determining whether students of NBC teachers demonstrated higher growth indexes compared to students taught by non-NBC teachers. The teacher sample included NBC and non-NBC teachers from the ABC School District. Participants taught Grades 3-5 in the district. The researcher utilized the following research questions to guide this study.

1. For students in Grades 3-5 in Title I schools, what was the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests?
2. For students in Grades 3-5 in Title I schools, what was the relationship of teacher math growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG math tests?

Results from previous studies were mixed when it comes to the question of whether the students of NBC teachers demonstrated greater growth indexes in reading and math compared to the students taught by non-NBC teachers. It is noted that few, if

any, of the previous studies factored in a school's Title I status in the analysis of the data; however, overall research findings may have been linked to other variables including teacher instructional practices, availability of resources, teaching experience, and school demographics. Like previous explorations of this topic, this study depended on a relatively small sample size that some might argue lacked statistical power. It is the researcher's belief that a small sample size does not necessarily preclude the value of the findings. Even with the presence of a larger sample size, the results may not be relevant enough to answer the question of student achievement.

The study utilized 89 core elementary teachers' growth-index EVAAS data from three different perspectives: overall, Title I, and non-Title schools. Archival data from the 2015-2016 school year were analyzed using the independent sample *t* test Levene's Test for Equality of Variance to determine if there were significant differences in reading and mathematics growth indexes of North Carolina EOG assessments between students at Title I schools taught by NBC teachers and non-NBC teachers. Most of the analyses indicated that student achievement had no significant difference being taught by NBC teachers and non-NBC teachers. No statistical difference was found in reading among students of NBC and non-NBC teachers. Additionally, no statistical difference was found among students of NBC and non-NBC teachers with years of experience.

With respect to additional analyses conducted, no statistical difference was found in EVASS teacher growth indexes with years of experiences, overall sample, Title I school sample, or non-Title I school sample. No statistical difference was found in math EOG testing or reading EOG testing in Grades 3-5; however, analyses revealed that there was a statistically significant difference among Grade 5 in the Title I school sample of students being taught by NBC and non-NBC teachers. Finally, there were no statistical

difference in EVAAS teacher indexes of NBC teachers and non-NBC teachers in the overall, Title I, and non-Title I school samples in reading or math. In the Title I school math sample, there was a significant difference in the teacher indexes with teaching experience within 21-30 years (Table 45).

The analyses of this study addressed two research questions: (a) For students in Grades 3-5 in Title I schools, what is the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests; and (b) For students in Grades 3-5 in Title I schools, what is the relationship of teacher math growth indexes between students taught by NBC teacher and student taught by teachers who were not NBC teachers and student taught by teachers who were not NBC as measured by North Carolina EOG math tests? Statistical analyses indicated that student achievement of those being taught by NBC teachers was not higher than students being taught by non-NBC teachers in overall, Title I, or non-Title I schools. Additional analyses were performed and determined that additional variables (years of experience, NBC teachers, non-NBC teachers, Title I schools, non-Title I schools, and overall schools in the district) were associated in student achievement.

This research sought to discuss the impact NBC teachers and non-NBC teachers have on North Carolina EOG reading and math student achievement growth in the Title I schools at ABC School District as reported in EVAAS. Based on literature, there are mixed results on NBC teachers compared to non-NBC teachers on student growth. Goldhaber and Anthony's (2007) conducted a 3-year study on the relationship between student achievement and teacher National Board Certification in the state of North Carolina. The study focused on Grades 3-5; the researchers observed 32,000 teachers.

The findings indicated that students of NBC teachers demonstrated greater gains in reading and math when compared to students of non-NBC teachers. Furthermore, Rouse (2008) and Harris and Sass (2009) reported that there was not a statistically significant difference in student achievement for NBC teachers and non-NBC teachers. ASCD (2004) examined the effectiveness of NBC teachers posing a similar research question: “Are teachers who achieve National Board for Professional Teaching Standards certification more effective than their non-certified peers” (para. 1)? To answer this question, the researcher used data from NBC teachers and non-NBC teachers in North Carolina from an archival sample provided by the school district of the study. While the findings from the study indicated that NBC teachers are more effective than their non-NBC colleagues, the researcher did not venture to study whether board certified teachers possess specific attributes that made them more effective.

### **Theoretical Framework**

This research seeking to explore a view of expertise as part of the theoretical framework can be used to inform policy and practice when it comes to teaching and the development of expertise (Kinchin & Cabot, 2010). The researcher evaluated Ericsson’s Expertise Theory that provided the theoretical foundation for this study and established the lens through which the data were examined and analyzed. The Expertise Theory introduced the idea that experts in a particular profession are able to demonstrate an advanced knowledge in their field. The expert, as Lyon (2015) described, is “fully engaged in fluid, efficient performance, responsive to context, based on previous situations, without obvious thought” (p. 92). Experts have a natural knowledge base derived from their everyday experiences (Dreyfus & Dreyfus, 1986), a term Schon (1983) called knowing-in-action. Hence, expert performance is defined as performance that

remains superior and is based on a set of subject-related standards (Ericsson & Charness, 1994).

Ericsson's Expertise Theory was used to examine professional performance standards, particularly how experts are always looking for ways to develop their skills to perform at the highest levels. This theoretical framework was used throughout the study based on NBC and non-NBC professional performance based on the teacher mean growth-index score used from EVAAS. The independent *t* test design was analyzed with years of experience.

Performance was a small but significant component of Ericsson's Expertise Theory. This was Ericsson's belief that experts should remain competitively aware of the need to constantly improve their level of performance in order to maintain an advantage in their field. High Fliers (2014) noted,

As those on the road to expertise are also constantly striving to improve their performance, it would be helpful for them to occasionally participate in competitive performance in order to assess their progression and placement in relation to their peers. (p. 13)

This rationale was considered most valuable when looking at the performance of NBC teachers and non-NBC teachers. If National Board Certification was considered a sign of mastery in a content area, one would expect a significant difference between the performances of teachers with NBC status compared to teachers who had not attained such status. Even when other variables are taken into account, the expert should theoretically have the advantage of higher skill sets and mastery knowledge; however, Ericsson, Krampe, and Tesch-Romer (1993) suggested that to "better understand expert and exceptional performance, we must require that the account specify the different

environmental factors that could selectively promote and facilitate the achievement of such performance” (p. 367). This may help explain the mixed results of other studies that sought to compare the performance of NBC and non-NBC teachers. Based on Ericsson’s theory, it may be logical to conclude that National Board Certification alone does not make one a master teacher. The results of this study demonstrated, with the exception of Grade 5 in the Title I reading sample and teachers with 21-30 years of experience Title I math sample, that there was no significant difference in student growth despite the NBC status of their teachers. Other studies (Harris & Sass, 2009; Rouse, 2008) found similar conclusions, which may cause questions to arise about the necessity and relevance of National Board Certification.

It is also noted that Ericsson et al. (1993) pointed out that while there are very few exceptions to the rule, practitioners in any field require 10 or more years of preparation to attain expert-level performance. In the current study, 14 of the 37 teachers (37.84%) had over 10 years of experience. If years of experience was, in fact, a significant factor in the acquisition of expert performance, it may explain the results of the current research study where 62% of participants had 10 years or less experience. Cohen’s  $d$  indicated a small effect size ( $d=0.14$ ) with the group 11-20 years and a medium effect size ( $d=0.6$ ) for group 21-30 years in Title I and non-Title I schools. Thus, both experience and mastery are necessary for a skill to be transformed to a higher level (Altmann, 2007).

### **Discussion of Findings**

The researcher wanted to investigate the impact NBC teachers have on North Carolina EOG reading and math student achievement growth in Title I schools as opposed to non-NBC teachers within the ABC School District as reported in EVASS. The results of this study may be compared to previous studies on the achievement of

students of NBC and non-NBC teachers. For example, studies conducted by Goldhaber and Anthony (2007) and Cowan and Goldhaber (2016) found there was a significant but small gain (0.5) in student achievement scores in math and reading for teachers with National Board Certification. The findings in Research Question 1 yielded results similar to the previous research.

The researcher used the general null hypothesis that there was no difference in the teacher mean growth index for reading between NBC teachers and non-NBC teachers. The alternate hypothesis was that there was a difference. The same general hypothesis was applied to the teacher math growth indexes. Under these circumstances, an independent sample *t* test was used for the analysis.

Based on the literature, it is reasonable to believe there were mixed results that students being taught by NBC teachers have had a significance difference. It is inconclusive whether or not NBC teachers are effective with student achievement with Title I schools. Studies from Belson et al. (2015); What Works Clearinghouse (2009); Holding and Fraser (2013); Phillips (2008); Goldhaber (2006); and Cavalluzzo (2004) found a statistically significant positive correlation between the proportion of teachers with National Board Certification and student scores on reading and math exams at the state level, while previous studies (Boulden, 2011; Harris & Sass, 2009; Rouse, 2008) found no statistically significant difference between students being taught by NBC and non-NBC teachers. Due to the nature of this study, the impact of NBC teachers in Title I schools is inconclusive. Since the statistics regarding NBC teachers who taught Grade 5 indicated a significant math growth in the overall, teachers in the overall sample with 11-20 experience and Title I samples based on test scores, this has implications for school districts as to the importance of National Board Certification on student achievement.

**Research Question 1: For students in Grades 3-5 in Title I schools, what was the relationship of teacher reading growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG reading tests?** Data were analyzed from three perspectives (overall, Title I, and non-Title I schools) and reflected the differences in NBC and non-NBC teachers. After examining the results of SPSS in Chapter 4, overall, Title I, and non-Title I school data indicated no significant difference in reading growth indexes of students taught by NBC and non-NBC teachers. The data indicated that students taught by NBC teachers in Title I schools had higher reading mean growth-index scores compared to non-NBC teachers in Grades 3-5. The findings from the study indicated that North Carolina EOG reading test scores of students in Grades 3-5 taught by NBC teachers had no significant difference between students taught by non-NBC teachers in Title I schools. The data reflected that NBC teachers had higher reading growth-index scores compared to non-NBC teachers in the Title I school sample.

In comparison to the overall and non-Title I samples, NBC teachers had mixed results with reading mean growth indexes. The non-NBC teachers in the overall and non-Title I samples in Grade 3 indicated higher reading mean growth-index scores; however, non-NBC teachers who taught Grade 5 indicated higher reading mean index scores. For the teachers in the overall, Title I, and non-Title samples with 11-20 and 21-30 years of experience, the data indicated that there was no significant difference between students taught by NBC and non-NBC teachers. After examining the three samples, NBC teachers indicated higher reading mean growth-index scores with 11-20 and 21-30 years of experience.

The data reflected that years of experience did not make any significant difference



for the overall, Title I, and non-Title I samples. The researcher learned that overall, Title I, and non-Title I samples indicated that there was no significant difference in student performance on the North Carolina EOG test. The study concluded that there were no significant differences for students in Grades 3-5 who were assessed on the North Carolina EOG reading test scores between students taught by NBC and students taught by non-NBC teachers. The researcher has learned that there were no significant differences between the two comparison groups of students who were assessed on the North Carolina EOG test in Grades 3-5 in the Title I schools.

In comparison to a similar study conducted by Harris and Sass (2009), results found there was not a significant difference in a statewide assessment in reading between students taught by NBC teachers and those students taught by non-NBC teachers. McCloskey et al. (2005) reported student test scores from over 300 teachers in three North Carolina public school districts over a 2-year period. The study concluded that there were no significant differences in reading growth indexes between students taught by NBC teachers and students of non-NBC teachers.

**Research Question 2: For students in Grades 3-5 in Title I schools, what was the relationship of teacher math growth indexes between students taught by NBC teachers and students taught by teachers who were not NBC as measured by North Carolina EOG math tests?** There were no data included for Grade 3 NBC teachers even though there were 12 NBC teachers in the data provided by the district. The present study further indicated mixed results. The math findings for overall, Title I, and non-Title I samples indicated no significant difference in math growth indexes for Grade 4 between students taught by NBC and non-NBC teachers. The results in Grade 5 from overall and Title I samples indicated significant differences in math growth indexes

between students taught by NBC and non-NBC teachers; however, the non-Title I sample indicated no significant difference between the two comparison groups. Overall, Title I and non-Title I sample data indicated higher math mean growth-index scores for NBC compared to non-NBC teachers in Grades 4 and 5. The findings from the study indicated that North Carolina EOG math growth indexes for teachers in Grade 4 had no significant difference between NBC and non-NBC teachers in Title I schools. There was no significant difference in math growth indexes between NBC and non-NBC teachers in Grade 5 in the Title I sample.

The overall sample for teacher experience group for 11-20 years indicated that there was a significant difference for students taught by NBC and non-NBC teachers. Title I and non-Title I samples for teacher experience groups for 11-20 years indicated that there were no significant differences in mean math growth indexes between NBC and non-NBC teachers. NBC teachers with 11-20 and 21-30 years of experience indicated higher math mean index scores compared to non-NBC teachers in overall, Title I, and non-Title I samples. The findings in Research Question 2 yielded results similar to research studies by Harris (2013) and McCloskey et al. (2005) and indicated no statistically significant difference in scores on a statewide assessment between students taught by NBC teachers and those students taught by non-NBC teachers. The researcher learned there was a significance difference in Grade 5 in overall and Title I comparison groups in student performance on the North Carolina EOG test.

In comparison to a similar study, Harris (2013) conducted a causal-comparative research and analyzed their data using a statistical procedure of ANCOVA. ANCOVA determined the difference in mathematics mean scale score growth on the MCT2 assessment between students taught by NBC teachers and non-NBC teachers in a Title I

school. The results indicated a statistically significant difference between students who were taught by NBC teachers and students who were taught by non-NBC teachers.

Stewart (2015) conducted a causal comparative study with 351 participants (64 NBC and 287 non-NBC mathematics teachers employed in four school districts in southeastern Louisiana). Two group mean ranks were compared to determine statistical significance in which the results could be generalized to the larger and similar population of teachers, given some limitations. The analysis of the data showed a significant difference between the two groups of mathematics teachers (Stewart, 2015).

The results were used as the sole indicator of teacher growth indexes without consideration of other possible variables. To further understand the findings of the study, an additional analysis was conducted to include data from teachers working in Title I and non-Title I schools. Based on these findings, there was no evidence that National Board Certification impacts student achievement. Grade 5 math results indicated a significant difference between the math index of NBC teachers and non-NBC teachers in overall and Title I schools. The researcher concluded the Title I sample indicated a significant difference in Grade 5 with the two comparison groups. The math data indicated that students being taught by NBC teachers showed a significant difference on the North Carolina EOG test from the overall and Title I samples in Grade 5.

### **Summary of Questions**

For the purposes of this study, math growth indexes of NBC teachers were compared with non-NBC teachers on the same grade level who taught the same subject matter. There was no initial disaggregation of teachers based on schools, although additional data did emerge that allowed a closer analysis of teachers from Title I schools and teachers from non-Title I schools in the ABC School District. Analyses included 89

reading and math core elementary teachers from schools in the ABC School District.

Scores from EOG assessments in reading and math were used for students assigned to NBC teachers and non-NBC teachers. No significant differences were found in reading North Carolina EOG test scores of students taught by NBC teachers when compared to the students taught by non-NBC teachers in overall, Title I, and non-Title I samples. There was a significant difference between NBC and non-NBC teachers who taught Grade 5 math overall and Title I samples. Results indicated a higher reading and math growth-index mean score for NBC teachers compared to non-NBC teachers with the exception of NBC teachers in the overall and non-Title I samples in Grade 3 (reading).

Data obtained from the ABC School District included non-Title I schools, although the original scope of the research focused solely on Title I schools. The researcher analyzed reading and math data from Grades 3-5 from students of NBC and non-NBC teachers from the overall, Title I, and non-Title I samples. After disaggregating the data for teacher years of experience and other extraneous variables, data results for Grades 3-5 reading *t* test indicated there was no significant difference between the achievement for students of NBC teachers and students of non-NBC teachers in the overall, Title I, and non-Title I samples. The data indicated there was no significant difference between NBC and non-NBC teachers with 11-20 and 21-30 years of experience in the overall, Title I, and non-Title I reading samples; however, NBC teachers indicated higher reading mean growth-index scores. Results for overall and non-Title I schools were similar in math, with no significant difference in achievement for the students of NBC and non-NBC teachers in Grade 4; however, Grade 5 indicated a significant difference between the two comparison groups in the overall and Title I

samples. The data indicated that there was no significant difference between NBC and non-NBC teachers with 11-20 and 21-30 years of experiences in the overall, Title I, and non-Title I reading samples; however, NBC teachers indicated higher math mean growth-index scores. A similar study was conducted in eastern North Carolina by Rouse (2004). Seventy-two NBC teachers and non-NBC teachers from one LEA participated in the study. The study consisted of 27 NBC and 27 non-NBC teachers who taught in Grades K-8. A matched-pair design was used along with a correlated samples *t* test with *a priori* of .05 to analyze the achievement level scores of the students. A statistically significant difference did not exist in student achievement for NBC teachers and non-NBC teachers in Grades K-8.

### **Limitations**

The research study had limitations, including a smaller number of core NBC teachers who taught Grades 3-5 compared to core non-NBC teachers who taught Grades 3-5. The population consisted of 41 NBC teachers and 48 non-NBC teachers who taught Grades 3-5. Another limitation of this study was due to the causal comparative design using participants who have taught grouped by three categories: 4-10 years, 11-20 years, and 21-30 years. Originally, 25 core NBC teachers and 25 core non-NBC teachers were part of the research. This limitation was due to the amount of teacher index data that were provided from the district. The number of core NBC teacher and core non-NBC teacher index data varied from 89 participants throughout the elementary school part of the ABC School District.

### **Recommendations for Future Research**

The findings in this study revealed that in a North Carolina school district, there was no significant difference in reading growth indexes between NBC teachers and non-

NBC teachers; however, the findings in this study revealed that in a North Carolina school district, there were mixed results in math growth indexes between NBC teachers and non-NBC teachers. In Grade 5 math, students of NBC teachers who had 11-20 years of experience at the overall and Title I school samples demonstrated higher growth indexes. In Grade 4, in the overall, Title I, and non-Title I samples, there was no significant difference between two groups; however, NBC teachers had a higher math growth index than non-NBC teachers. This research was limited only to the 2015-2016 academic school year in the ABC School District. The current study focused on NBC and non-NBC teacher growth indexes in Grades 3-5 in overall, Title I, non-Title I and teacher years of experience in schools in a district in North Carolina.

The researcher recommends a future causal comparative study to examine a larger sample of NBC and non-NBC teachers in all Title I schools to determine if the results of this study are consistent with findings related to other Title I schools in North Carolina. Similar research should be conducted on a state-wide basis.

The researcher suggests future study to investigate lower elementary grades in Title I schools (kindergarten, first, and second grades) to determine if the results of this study are consistent with findings in other grades. Grade 5 is the end of a student's elementary career. Since there was a significant difference of students being taught by NBC teachers in the overall and Title I math samples in Grade 5, further research should be conducted on EOG testing for only Grade 5 and continue to assess kindergarten through Grade 4.

It may be advantageous for future research to focus on conducting studies using multiple measures (i.e., alternative assessments, benchmark assessments, portfolios) to determine whether National Board Certification impacts student learning (Flanagan et al.,

2008). While educators are more inclined to use student assessment data as a primary or, in some cases, sole basis for measuring teacher effectiveness, it may be constructive to use multiple data forms to evaluate teacher and student performance (Flanagan et al., 2008). Although researchers found that NBC teachers were more effective in increasing student achievement than non-NBC teachers, there was no evidence that the certification process alone impacts student achievement (Boulden, 2011). Future research studies should include the use of mixed-method designs and include student performance on both formative and summative assessments (Manzeske et al., 2017). Subsequent findings from this study could be used to increase teacher understanding of their own instructional practices through self-reflection and increase their proficiency in using data to drive instruction so as to improve teaching and learning experiences in the classroom. There could be further investigation of whether there are specific instructional practices implemented by NBC teachers who promote greater student achievement (Manzeske et al., 2017). Likewise, there may be questions that arise concerning the significance of National Board Certification. Previous studies have offered conflicting findings attempting to correlate National Board Certification with student achievement. Few studies have offered teacher viewpoints in an attempt to understand the impact of National Board Certification in the classroom. It would be beneficial to provide teacher descriptions of how they perceive their students may have been influenced by any changes made in their teaching as a result of participating in the certification process.

The question remains whether the National Board Certification process is even necessary or should the focus be on improving the instructional practices of all teachers so all students benefit? If there is no significant difference in student achievement despite the presence of National Board Certification, is the pursuit of such certification in

the best interest of teachers considering the certification process? Furthermore, although this study alone should not be used to make decisions regarding the continued support of National Board Certification in the state of North Carolina, it can be used to support whether continued state funding of teachers with National Board Certification is warranted. This is particularly important since many states either offer monetary incentives for teachers to complete the National Board Certification process (Belson et al., 2015) or for teachers who are already NBC (Cowan & Goldhaber, 2016).

North Carolina is a state with the highest number of NBC teachers, yet student achievement results suggest student performances are not influenced by the National Board Certification of these teachers (Cavalluzzo et al., 2014); however, the debate of whether or not National Board Certification improves the quality of teaching practices remains relevant not only in North Carolina but across the nation.

## **Conclusions**

The present study extends previous studies of NBC and non-NBC teachers and the impact on student achievement. First, the present study compared the impact at overall, Title I, and non-Title I schools taught by NBC and non-NBC teachers. Second, the present study compared by teacher years of experiences. The researcher hypothesized that the NBC teacher growth index would be higher compared to non-NBC teachers. According to the researcher's prediction, the current study is showing that there is no statistical difference with students being taught by NBC teachers or non-NBC teachers in the overall, Title I, and non-Title I schools samples in the reading North Carolina EOG test in Grades 3-5; however, there was some significance in Grade 5 math in the overall and Title I samples and teachers with 11-20 years of experience.

As evidenced by the present study and other studies, research on NBC and non-



NBC teacher impact on student achievement yielded mixed results. The results from the present study revealed that there was a statistically significant difference among Grade 5 in the overall and Title I school samples of students being taught by NBC teachers; however, in Grades 3 and 4, the current study is stating that there is no statistical difference with students being taught by NBC teachers or non-NBC teachers in Title I and non-Title I schools. For NBC teachers working in Title I schools, there was a significant difference in student growth in math. These results were applicable only to those teachers with 11-20 years of experience.

What Works Clearinghouse (2018) reported similar results for NBC teachers; although noting mixed effects on student achievement in mathematics, there were no apparent effects in the area of reading achievement for students in Grades 3-5. While several researchers, including Cavalluzzo (2004), found small statistically significant differences between NBC teachers and their colleagues, no such differences were found when analyzing NBC teachers and their colleagues from Title I and non-Title I schools (The Governor's Office of Student Achievement, 2009, para. 8). In other words, students of NBC teachers did not demonstrate any significant gains over the students of non-NBC teachers.

Flanagan et al. (2008) "offer[ed] recommendations for three audiences: researchers, policymakers, and National Board for Professional Teaching Standards" (p. 16). It is this researcher's suggestion that similar audiences would benefit from the findings of the study. Questions regarding the effectiveness of National Board Certification will likely persist. While some studies have established links between student achievement and National Board Certification, researchers in other studies have found no such link. The study findings indicated that there were no statistically

significant difference in reading scores of NBC versus non-NBC teachers in Grades 3-5 in reading; but in Grade 5 math, there was a significant difference for NBC teachers with 11-20 years of experiencing at Title I schools. It may be presumed that other variables have an impact of the findings of this and other studies that focus on NBC teachers and the achievement of their students; however, additional variables have been excluded in an effort to focus only on the teacher effectiveness, add to the existing literature, and potentially lay the groundwork for future study into this topic.

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## Appendix A

### State Rank and Incentive for Board Certification



**State Rank and Incentive for Board Certification**

<b>Rank</b>	<b>State</b>	<b>Incentive for Board Certification</b>	<b>Total Number of NBCTs</b>
1	NC	NBCTs placed on salary schedule 12% above base pay	20,677
2	FL	Not Applicable	13,566
3	SC	\$5,000 stipend (up to 10 years)	8,863
4	WA	\$5,090 annual stipend. Additional \$5,000 annually to NBCTs in high need schools	8,461
5	CA		6,345
6	IL	\$1,500 annually may be available to NBCTs who agree to provide mentoring or professional development	6,034
7	MS	\$6,000 annual stipend; additional \$4,000 for NBCTs in 13 counties	3,849
8	OH	Not applicable	3,325
9	KY	\$2,000 annual stipend	3,273
10	VA	Initial \$5,000 award; subsequent \$2,500 annually	3,119
11	OK	NBCTs may earn up to an additional \$1,000/year	3,050
12	AR	\$5,000 annually for NBCTs who certify before 2018. NBCTs who certify after 2018 receive: \$2500 annually if they do not teach in a high-poverty school (for five years); \$5000 annually if they teach in a high-poverty school not located in a high-poverty district (five years); \$10,000 annually if they teach in a high-poverty school in a high-poverty district (10 years)	2,869
13	MD	State will match \$1,000 from districts annually, and will match an additional \$1,000 annually to NBCTs in high need schools	2,785
14	GA	Not applicable	2,572
15	AL	\$5,000 annual stipend	2,339
16	LA	Not applicable	1,867
17	NY	Not applicable	1,750
18	PA	Not applicable	1,219
19	AZ	Not applicable	1,196
20	WI	\$2,500 annual stipend after first year. Additional \$2,500 annually to NBCTs in high need schools	1,117
21	NM	Annual 1.5 program unit stipend ~\$5,800	1,014
22	MO	Not applicable	933
23	CO	\$1,600 annual stipend stipend; additional \$3,200 annually for NBCTs in high need schools	898
24	WV	3,500 annual stipend; additional \$2,000 to NBCTs in low-performing schools	860
25	TX	Not applicable	849

26	LA	Not applicable	718
27	TN	Not applicable	672
28 (TIED)	MA	Not applicable	633
28 (TIED)	NV	5% annual salary increase	633
30	WY	\$4,000 annual stipend	628
31	HI	\$5,000 annual stipend; additional \$5,000 annually for NBCTs in high need schools	554
32	RI	Not applicable	511
33	DE	Not applicable	457
34	MN	Not applicable	418
35	KS	Districts are responsible for \$1,000 annual stipend	403
36	MI	Not applicable	394
37	ID	\$2,000 annually (for 5 years)	382
38	OR	NBCTs may earn up to an additional \$1,000/year	309
39	ME	\$3,000 annual stipend	293
40	NJ	Not applicable	267
41	UT	\$1,500 annually for NBCTs in Title I schools; \$750 annually for NBCTs in other schools	242
42	AK	Not applicable	175
43	IN	Not applicable	169
44	CT	Not applicable	148
45 (TIED)	MT	\$2,500 annual stipend for NBCTs in high- need schools and \$1500 annual stipend for other NBCTs; both stipends are contingent on a district contribution of \$500.	139
45 (TIED)	VT	Not applicable	139
47	NE	\$5,000 annual stipend	117
48	SD	\$2000 annual stipend for at least 5 years	103
49	DC	Not applicable	84
50	ND	\$1,000 annual stipend	44
51	NH	Not applicable	26

<b>U.S. TOTAL</b>	111,488
<b>TOTAL NBCTs</b>	112,286

## Appendix B

### Reading Achievement Level Descriptors for Grades 3-5

### Reading Achievement Level Descriptors for Grades 3-5

Reading Achievement Level	Grade	Achievement Range	Description
1	3	$\leq 431$	Students performing at this level have limited command of the knowledge and skills contained in the Common Core State Standards (CCSS) Reading Standards for Literature, including informational text and language. Not Career and College Ready.
	4	$\leq 438$	
	5	$\leq 442$	
2	3	432-438	Students performing at this level have partial command of the knowledge and skills contained in the Common Core State Standards (CCSS) Reading Standards for Literature, including informational text and language. Not Career and College Ready.
	4	439-444	
	5	443-449	
3	3	439-441	Students performing at this level have a sufficient command of grade-level knowledge and skills contained in the Common Core State Standards (CCSS) Reading Standards for Literature assessed at grades 3 4, or 5, but they may need academic support to engage successfully in this content area in the next grade level. Not Career and College Ready.
	4	445-447	
	5	450-452	
	3	442-451	

4	4	448-459	Students performing at this level have solid command of the knowledge and skills contained in the Common Core State Standards (CCSS) Reading Standards for Literature, including informational text and language. Career and College Ready.
	5	453-463	
5	3	$\geq 452$	Students performing at this level have superior command of the knowledge and skills contained in the Common Core State Standards (CCSS) Reading Standards for Literature, including informational text and language. Career and College Ready.
	4	$\geq 460$	
	5	$\geq 464$	

## Appendix C

### Mathematics Achievement Level Descriptors for Grades 3-5

### Mathematics Achievement Level Descriptors for Grades 3-5

Math Achievement Level	Grade	Achievement Range	Description
1	3	$\leq 439$	Students performing at this level have <b>limited command</b> of the knowledge and skills contained in the <i>Common Core State Standards (CCSS)</i> for Mathematics assessed at grades 3, 4, or 5 and are likely to need intensive academic support to engage successfully in further studies in this content area. Not Career-and-College Ready
	4	$\leq 440$	
	5	$\leq 440$	
2	3	440-447	Students performing at this level have partial command of the knowledge and skills contained in the <i>Common Core State Standards (CCSS)</i> for Mathematics assessed at grades 3, 4, or 5 and are likely to need additional academic support to engage successfully in further studies in this content area. Not Career-and-College Ready
	4	441-448	
	5	441-448	
3	3	448-450	Students performing at this level have a <b>sufficient command</b> of grade-level knowledge and skills contained in the <i>Common Core State Standards (CCSS)</i> for Mathematics assessed at grades 3, 4, or 5 but they may need academic support to engage successfully in this content area in the next grade level. They are prepared for the next grade level but are not yet on track for college-and-career readiness without additional academic support.
	4	449-450	
	5	449-450	

4	3	451-459	Students performing at this level have solid command of the knowledge and skills contained in the <i>Common Core State Standards (CCSS)</i> for Mathematics assessed at grades 3, 4, or 5 and are academically prepared to engage successfully in further studies in this content area.
	4	451-459	
	5	451-459	
5	3	$\geq 460$	Students performing at this level have superior command of the knowledge and skills contained in the <i>Common Core State Standards (CCSS)</i> for Mathematics assessed at grades 3, 4, or 5 and are academically well prepared to engage successfully in further studies in this content area. Career and College Ready.
	4	$\geq 460$	
	5	$\geq 460$	



## Appendix D

Dynamics (grade and specialty areas) of the National Board Certified Teachers in the  
ABC School District at their Title I Elementary Schools

**Dynamics (grade and specialty areas) of the National Board Certified Teachers in  
the ABC School District at their Title I elementary schools**

**School**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	3	8.1	8.1	8.1
	B	3	8.1	8.1	16.2
	BB	2	5.4	5.4	21.6
	G	1	2.7	2.7	24.3
	I	1	2.7	2.7	27.0
	J	1	2.7	2.7	29.7
	K	3	8.1	8.1	37.8
	M	3	8.1	8.1	45.9
	N	2	5.4	5.4	51.4
	Q	5	13.5	13.5	64.9
	R	3	8.1	8.1	73.0
	T	3	8.1	8.1	81.1
	X	1	2.7	2.7	83.8
	Y	1	2.7	2.7	86.5
	Z	5	13.5	13.5	100.0
	Total	37	100.0	100.0	

## Appendix E

### Cronbach Coefficient Alpha for EOG Reliabilities

### Cronbach Coefficient Alpha for EOG Reading Reliabilities

*Cronbach Coefficient Alpha for EOG Reading Reliabilities*

<b>Grade</b>	<b>Form A</b>	<b>Form B</b>	<b>Form C</b>
3	0.91	0.92	0.91
4	0.89	0.90	0.88
5	0.90	0.88	0.89

*Cronbach Coefficient Alpha for EOG Mathematics Reliabilities*

<b>Grade</b>	<b>Form A</b>	<b>Form B</b>	<b>Form C</b>
3	0.91	0.92	0.91
4	0.92	0.92	0.92
5	0.91	0.92	0.91