

ABSTRACT

Jonathan Styers McRae, *ADVANCING THE SCIENCE OF HIRING TEACHERS: AN ANALYSIS OF THE EFFECTS OF TEACHER CHARACTERISTICS ON STUDENT ACHIEVEMENT* (Under the direction of Dr. William Grobe) Department of Educational Leadership, October, 2014.

This study examined the effect of teacher characteristics on student achievement as measured by the 2011 North Carolina End-of-Course English I exam. The purpose of this study is to identify teacher characteristics with a positive effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural southeastern North Carolina.

The method of analysis used to conduct the study examining the relationship between teacher characteristics and student achievement will be multiple linear regression. The research design includes: (a) criteria used for study selection, (b) operational definitions of the constructs being studied, (c) description of instruments used to measure the constructs, (d) the processes used to locate data, and (e) a description and table of the identified data. This is followed by a description of the coding processes used in documenting pertinent data from the study. The research design includes a description of the multiple linear regression processes used in synthesizing the data and the processes used in the analysis of the statistics generated from the multiple linear regression. All data relating to this study was collected from the database at the North Carolina Education Research Data Center (NCERDC) at Duke University after receiving approval from East Carolina University's Institutional Review Board.

Results of the data indicated that the teacher characteristics, National Board Certification, college attended, and teaching experience had a significant effect on student achievement on the 2011 North Carolina End-of-Course English I exam. The data indicated student test scores associated with National Board Certification, attended a UNC institution as an undergraduate,

and zero years experience were higher than student test scores associated with other teacher characteristics.

ADVANCING THE SCIENCE OF HIRING TEACHERS: AN ANALYSIS OF THE EFFECTS
OF TEACHER CHARACTERISTICS ON STUDENT ACHIEVEMENT

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Jonathan Styers McRae

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ADVANCING THE SCIENCE OF HIRING TEACHERS: AN ANALYSIS OF THE EFFECTS
OF TEACHER CHARACTERISTICS ON STUDENT ACHIEVEMENT

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DEDICATION

This study is dedicated to my family. Without their support and love this would not have been possible. My sons, Eli and Owen are my inspiration for completing this degree. Eli sat on my lap through enough on-line courses, I think he has earned at least six credits towards a future degree. Owen created enough distractions to make sure I took breaks to stay sane during this process. To my mother, Martha Gibson, for her shared insight, while she completed her dissertation at the same time. To my father, John McRae, for his support and encouragement.

Most of all, this study is dedicated to my wife, Jennifer McRae, who I adore for her unwavering support over not just the period of my doctoral studies, but during our entire relationship. You erase all doubt I have in myself and make me a better person. Thank you for doing the things that needed to be done to ensure I could focus on my studies. You mean more to me than you will ever know.

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CHAPTER ONE: INTRODUCTION

Overview

As education budgets decrease and school accountability increases, school administrators must be able to guide their schools to meet the new expectations related to student achievement. School administrators have to maximize the resources available to their students. One major part of this goal is improving the quality of teachers in each classroom. School administrators have numerous responsibilities with the hiring of an effective staff being the most important (Bolz, 2009; Bredeson, 1985; Natter & Kuder, 1983; Peterson, 2002; Place & Drake, 1994; Rothman, 2004; Mason & Schroeder, 2010; Robbins & Alvy, 2003). Every teaching vacancy must be viewed as an opportunity to improve student achievement. Several studies have revealed a direct link between effective teaching and increased student achievement, therefore refocusing efforts on hiring practices may result in positive outcomes for schools (Danielson & McGreal, 2000; Fullan, 2001; Kersten, 2008; Marzano, Pickering, & Pollock, 2001; Stronge, 2002; Tucker & Stronge, 2005).

Many school administrators rely on the art of hiring teachers. They depend on anecdotal evidence, or learn to trust their gut. As Mason and Schroeder (2010) suggest, school administrators must reduce the uncertainty of hiring teachers to ensure their schools' success. This study focused to increase the science of hiring teachers. Focusing the hiring process on criteria known to be effective may increase the opportunity for improved student achievement (Kersten, 2008; Mason & Schroeder, 2010; Papa & Baxter, 2008; Temes, 2002). Developing a better understanding of teacher characteristics with a positive effect on student achievement may lead to the creation of a plan to increase a school system's potential to hire the best teachers.

Upon posting a teaching vacancy, school administrators can be overwhelmed with applicants; prioritizing can be difficult. Research recommends establishing a process for hiring new staff members that ensures only high quality (Kersten, 2008; Mason & Schroeder, 2010). Identifying characteristics with the greatest impact on student achievement would provide school administrators a guide to reduce the applicant pool. The purpose of this study is to identify teacher characteristics with a positive effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural southeastern North Carolina. The information generated by the analysis may be helpful to school administrators in their evaluation of teacher candidates for English vacancies.

Need for the Study

As school systems face concurrent issues of lost revenue and increased accountability, a search for effective methods of school improvement are more critical. Research suggests some improvement methods are misguided (Temes, 2002). Many times the proposed methods of school improvement are expensive. Sometimes the expense of the improvement is sponsored by an outside agency with an agenda all their own. Other times the improvements are short-lived and/or ineffective. They may be tied to an individual or group and do not continue once they have left the district. Futernick (2010) is concerned the number of failed school improvement plans may lead the public to believe the obstacles existing in low-performing schools are too great to overcome. School systems need cost-effective methods to increase student learning and achievement.

One of these methods may be simply hiring better teachers. If a principal makes a commitment to selecting teachers who possess characteristics with a positive correlation to student achievement, they may be able to make significant change (Futernick, 2007). This

method can be utilized in three main ways; removing entire staffs at low performing schools, adding monetary incentives to accept positions at low performing schools, and hiring school administrators who have shown an ability to recruit high quality teachers.

Statement of the Problem

Studies show that classroom teachers have the greatest impact on student achievement (Aaronson, Barrow, & Sander, 2007; Kane, Rockoff, & Staiger, 2008; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004; Sanders & Rivers, 1996). Current literature that similar school effects on student achievement and improving teacher qualifications may lead to improved results (Boyd, Lankford, Loeb, Rockoff, & Wyckoff, 2008; Carlisle, Kelcey, Rowan, & Phelps, 2011; Nye, Konstantopoulos, & Hedges, 2004; Rivkin et al., 2005; Rowan, Correnti, & Miller, 2002; Sanders & Horn, 1994). The difference between an effective and ineffective teacher may be as large as one full grade level of student achievement in a single year (Hanushek, 1992). Principals can improve student achievement by implementing an effective hiring procedure. Identifying the effect sizes of various teacher characteristics may improve school administrators' ability to hire effective teachers.

Much of the research suggests an unequal distribution of effective and ineffective teachers among poverty levels of schools (Carlisle et al., 2011; Clotfelter, Ladd, & Vigdor, 2006; Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Goldhaber, Gross, & Player, 2011). The evidence of unequal teacher distribution raises questions about the magnitude of the disadvantages caused by this issue (Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Goldhaber et al., 2011). Small rural school districts face challenges when recruiting and retaining high quality teachers. School administrators at low-wealth schools, based on the percentage of students identified as receiving free or reduced lunch, may experience difficulty in attracting

highly qualified teachers (Jepsen & Rivkin, 2009). In order to improve the quality of instruction, the quality of candidates needs to improve. How can small rural school districts compete?

Purpose of the Study

The purpose of this study is to identify teacher characteristics with a positive effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural southeastern North Carolina. The information generated by the analysis may be helpful to school administrators in their evaluation of teacher candidates for English vacancies.

Significance of the Study

Multiple studies have developed effective research models and provided data to analyze how a variety of teacher characteristics affect student achievement (Aaronson, Barrow, & Sander, 2003; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2006; Clotfelter, Ladd, & Vigdor, 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008; Nye et al., 2004). A consistent finding is a great variation exists in the effectiveness of teachers (Bosshardt & Watts, 1994; Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008). The difference between an effective and ineffective teacher may be as large as one full grade level of student achievement in a single year (Hanushek, 1992). This difference is significant to understanding how powerful an influence teachers have on student achievement (Borman & Kimball, 2005). The achievement of a fifth-grade student may be impacted by the quality of their third grade teacher (Sanders & Rivers, 1996). Even though it is commonly agreed teachers have a great impact on student achievement, attempts to identify and quantify the effective teacher characteristics have produced mixed results.

Each year, the North Carolina Department of Public Instruction administers North

Carolina End-of-Course (NC EOC) exams for a variety of subjects, including English I, which is a requirement for high school graduation. The results from the English I NC EOC are reported in two ways - a student scale score and student achievement level. A number assigned to performance on the English I NC EOC represents a student's scale score. The North Carolina Department of Public Instruction uses student scale scores to establish four achievement levels. An achievement level four is defined as superior performance, achievement level three is consistent mastery, achievement level two is inconsistent mastery, and achievement level one is insufficient mastery. Additionally, achievement levels three and four are defined as proficient, while achievement levels one and two are defined as non-proficient. Students must receive a proficient score to receive course credit applied to graduation.

Students in low-wealth school districts in Region 4 performed below the state average on the 2011 North Carolina End-of-Course English I exam. As Table 1 indicates (North Carolina Department of Public Instruction [NCDPI], 2014), student achievement in these school districts is between 4.9 and 17.9 percentage points below the state average (see Table 1).

This may result in large numbers of students who are ineligible to graduate from high school. The economy of southeastern North Carolina is facing challenges attracting industry and creating jobs. As indicated in Table 2 (North Carolina Department of Commerce, 2013), all of the counties included in this study, except Hoke County, have unemployment rates significantly higher than the state average (see Table 2).

In this region, students without a high school diploma will face challenges finding employment. Improving student achievement may provide an opportunity to improve the economy.

Table 1

2011 English I EOC Proficiency Rates

School District	2011 English I EOC Exam Results
State Average	80.6%
Hoke County Schools	70.7%
Columbus County Schools	70.3%
Richmond County Schools	72.1%
Public Schools of Robeson County	62.7%
Scotland County Schools	75.7%
Whiteville City Schools	75.6%

Table 2

2012 Unemployment Rate

<u>County</u>	<u>2012 Unemployment Rate</u>
Hoke County	9.0%
State Average	9.5%
Richmond County	12.7%
Columbus County	12.8%
Robeson County	12.8%
Scotland County	16.6%

The findings in this study may help improve the teacher selection process. Research recommends establishing a process for hiring new staff members that ensures only high quality (Kersten, 2008; Mason & Schroeder, 2010). There is no guarantee of hiring a great teacher, but steps can be taken to improve that likelihood (Mason & Schroeder, 2010). Mason and Schroeder (2010) believe principals should hire soon after a teaching vacancy is created. This will provide the advantage of a greater pool of candidates. They also suggest that effective hiring will be different for each school as the school demographics, school type, and principal experience may value a different set of teacher qualities. Kersten (2008) found that principals with knowledge of best practices in the hiring process held an advantage over their peers. Kersten (2008) believes principals with these understandings will hire more effective teachers than other principals. Recommendations will be developed for low-wealth school districts to improve the recruitment and retention of teachers with effective characteristics. It is hopeful that this plan will assist administrators in selecting and retaining high quality candidates that will improve the quality of instruction at their school.

Research Questions

The multiple linear regression approach will be used to address the following research questions:

1. What is the nature of teacher characteristics for English I teachers in North Carolina low-wealth school districts in Region 4?

The second question to be addressed is pending the availability of sufficient data for each of the identified teacher characteristics.

2. What is the effect size of specific teacher characteristics on student achievement on North Carolina End-of-Course English I exams in low-wealth districts?

The third question to be addressed is pending the availability of sufficient data for each of the identified teacher characteristics.

3. What teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams, have the greatest effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth districts and how can these commonalities be used to improve school administrators' ability to identify and recruit highly effective teachers?

Multiple studies have developed effective research models and provided data to analyze how a variety of teacher characteristics affect student achievement as measured by standardized testing (Boyd et al., 2006; Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008). Teaching experience appears to have a significant correlation to student achievement as measured by standardized testing (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006).

However, some of the research indicates small or no correlation between teacher characteristics and student achievement as measured by standardized testing (Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009).

Hypothesis

The null hypothesis assumed there would be no correlation between teacher characteristics and student achievement. The research hypothesis proposed that the synthesis of research would show a significant effect size between specific teacher characteristics and student accountability data.

Overview of Methodology

The method of analysis used to conduct the study examining the relationship between

teacher characteristics and student achievement will be multiple linear regression. The research design includes: (a) criteria used for study selection, (b) operational definitions of the constructs being studied, (c) description of instruments used to measure the constructs, (d) the processes used to locate data, and (e) a description and table of the identified data. This is followed by a description of the coding processes used in documenting pertinent data from the study. The research design includes a description of the multiple linear regression processes used in synthesizing the data and the processes used in the analysis of the statistics generated from the multiple linear regression.

Scores on the 2011 North Carolina End-of-Course English I exam will be used to determine the relationship between teacher characteristics and student achievement. The dependent variable for this study will be student achievement as measured by the achievement level on the 2011 North Carolina English I EOC. The dependent variable will be relevant to the study, having been used by other researchers (Xu et al., 2011, pp. 456-457).

The study will provide a calculated effect size for multiple teacher characteristics on standardized test scores. The teacher characteristics will serve as the independent or explanatory variables. The teacher characteristics for study will be: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams. The independent, or explanatory, variables will be relevant to the study, having been used by other researchers (Clotfelter et al., 2006).

Definition of Terms

For the purpose of this study, the following operational definitions have been established:

Highly qualified teacher - A Highly Qualified teacher is defined as one who has obtained full state teacher certification or has passed the state teacher licensing examination and holds a

license to teach in the state; holds a minimum of a bachelor's degree; and has demonstrated subject area competence in each of the academic subjects in which the teacher teaches (NCDPI, 2013).

End-of-Course (EOC) Tests - EOC tests are designed to assess the competencies defined by the North Carolina Standard Course of Study for each of the following courses: English I, English I, and Biology. Tests are taken during the last 10 days of school or the equivalent for alternative schedules (NCDPI, 2013).

Student achievement - Student achievement on North Carolina's End-of-Grade and End-of-Course tests is reported by achievement level. There are four achievement levels:

- Level I: Students performing at this level do not have sufficient mastery of knowledge and skills in this grade level or subject area to be successful at the next grade level or at a more advanced level in this subject area.
- Level II: Students performing at this level demonstrate inconsistent mastery of knowledge and skills in this grade level or subject area and are minimally prepared to be successful at the next grade level or at a more advanced level in this subject area.
- Level III: Students performing at this level consistently demonstrate mastery of this subject matter and skills and are well prepared for the next grade level (EOG) or for a more advanced level in this subject area (EOC).
- Level IV: Students performing at this level consistently perform in a superior manner clearly beyond that required to be proficient in this grade level or subject matter and are very well prepared for the next grade level or for a more advanced level in the subject area (NCDPI, 2013).

School improvement - As defined by the North Carolina General Assembly (1996), school improvement should be developed in a plan (SIP) that considers:

- The goals set out in the mission statement for the public schools adopted by the State Board of Education (SBE), and
- the annual performance goals for that school as established by the SBE under G.S. §115C-105.35, which states annual performance goals shall:
- Focus on student performance in the basics of reading, mathematics, and communications skills in elementary and middle schools,
- Focus on student performance in courses required for graduation and on other measures required by the State Board of Education in high schools, and
- Hold schools accountable for the educational growth of their students.

Teacher characteristics - Teacher characteristics include characteristics, such as teacher licensure score and advanced degrees (Clotfelter et al., 2006).

Low-wealth - As related to public schools, the designation for a low-wealth, or high poverty school is based on the percentage of students defined as Economically Disadvantaged. Economically Disadvantaged students were identified as receiving free or reduced lunch in accordance with a Memorandum of Agreement between the Child Nutrition Services Section and the Division of Accountability Services dated November 30, 2009 (NCDPI, 2013).

Assumptions

This study is based on several assumptions.

- One assumption is teacher quality can be measured. Another assumption relates to the ability of a standardized test, such as the North Carolina End-of-Course English I exam, to measure student knowledge.

- In this study, it is an assumption that the independent variables of teaching experience, college attended, advanced degrees, National Board Certification, teacher certification status, and licensure exams are measures of teacher quality.
- Another assumption is that standardized tests can measure student knowledge about English I. The North Carolina End-of-Course English I exam is stated to measure student knowledge about English I.
- Finally, it is assumed that the relationship between teacher quality variables and student achievement on the North Carolina End-of-Course English I exam is related.

Limitations

This study was limited in several ways.

- First, the overall sample size of teachers ($n = 45$) and students test scores ($n = 2749$) was small. The five school districts selected for study have a student population less than 10,000. The majority of these five districts have one large comprehensive high school with approximately nine English teachers.
- Secondly, demographic variables were often small and some variables were collapsed to accommodate small sample sizes for certain independent variables.
- A third limitation is the sample was limited to five low-wealth school districts in southeastern North Carolina. It is possible these teachers are not representative of the general population of English I teachers.
- A fourth limitation is data from one school year is used to complete the analysis.
- Finally, other variables not examined in this study, such as parental involvement, may influence student performance on standardized tests.

Summary

The following chapters of this study are organized in a five-chapter format. Chapter 2 is a review of the literature relevant to teacher effectiveness, student achievement, school administrator hiring practices, and school reform. Chapter 3 outlines the methodology used in conducting the multiple linear regression that will measure the effect size of a variety of teacher characteristics on student achievement. The design of the study and data collection procedures are explained in detail. Chapter 4 discusses the findings of the multiple linear regression as they relate to the established research questions and hypotheses. Chapter 5 provides the conclusions reached through the study, the implications for practice, and recommendations for future studies.

CHAPTER TWO: LITERATURE REVIEW

The purpose of this study is to identify teacher characteristics with a positive effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural, southeastern North Carolina. The information generated by the analysis may be helpful to school administrators in their evaluation of teacher candidates for English vacancies. The literature review is divided into three sections: (1) teacher effect on student achievement, (2) challenges facing low-wealth districts, and (3) hiring practices of school administrators.

First, the literature review examines research related to a teacher's effect on student achievement. This section focuses on literature quantifying this effect. The literature investigates teacher characteristics' effects on student achievement, which include: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams (Clotfelter et al., 2006). Other factors affecting student achievement related to this study come from various sources: (1) standardized testing, (2) teacher-student relationships, (3) professional development, (4) teacher evaluations, (5) class size, and (6) teacher-student matching (Clotfelter et al., 2006; Darling-Hammond & Rustique-Forrester, 2005; Hughes, Wu, Kwok, Villarreal, & Johnson, 2012; Jepsen & Rivkin, 2009).

Next, the literature review will examine challenges for low-wealth school districts with an analysis of teacher characteristics with an effect on student achievement. Then, it examines the importance of teacher recruitment and retention in low-wealth districts. The section concludes with reviewing literature related to factors attempting to improve student achievement in low-wealth districts: (1) Teach for America, (2) standardized testing, and (3) class size. These

factors were relevant to the study, having been used over time by other researchers (Darling-Hammond & Rustique-Forrester, 2005; Jepsen & Rivkin, 2009; Xu, Hannaway, & Taylor, 2011)

The literature review concludes with a review of research related to the hiring practices of school administrators. The section begins by highlighting literature related to the importance of hiring effective teachers. Next, it analyzes studies focused on hiring as a method of school reform and previous efforts to improve teacher quality. Two case studies are explored: (1) Central Falls High School, Rhode Island and (2) Guilford County Schools, North Carolina. Then, the literature review analyzes research attempting to answer why good teachers are leaving schools. Finally, studies identifying methods principals can use to improve the recruitment of effective teachers are reviewed.

Teacher Effect on Student Achievement

Much education literature has focused on a teacher's effect on student achievement (; Aaronson et al., 2007; Kane et al., 2008; Rivkin et al., 2005; Rockoff, 2004; Sanders & Rivers, 1996). Researchers have attempted to determine a teacher's effectiveness and found it may vary from teacher to teacher (Aaronson et al., 2007; Kane et al., 2008; Rivkin et al., 2005; Rockoff, 2004; Sanders & Rivers, 1996). A teacher's effectiveness is a large factor in student learning (Bosshardt & Watts, 1994; Boyd, Lankford, & et al., 2008). Understanding how a teacher's characteristics affect student achievement could improve a principal's ability to hire effective teachers.

Teacher Characteristics

Multiple studies have developed effective research models and provided good data to analyze how a variety of teacher characteristics affect student achievement (Aaronson et al., 2003; Boyd et al., 2006; Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et

al., 2008; Nye et al., 2004). A consistent finding in the research is a great variation exists in the effectiveness of teachers (Borman & Kimball, 2005; Bosshardt & Watts, 1994; Boyd, Lankford, & et al., 2008). The difference between an effective and ineffective teacher may be as large as one full grade level of student achievement in a single year (Hanushek, 1992). This difference is significant to understanding how powerful an influence teachers have long-term (Borman & Kimball, 2005). The achievement of a fifth-grade student may be impacted by the quality of their third grade teacher (Sanders & Rivers, 1996). Even though it is commonly agreed teachers have a great impact on student achievement, attempts to identify and quantify the effective teacher characteristics have produced mixed results.

Most studies attempt to quantify the size of a teacher's effect on student achievement as measured by standardized test scores (Borman & Kimball, 2005; Bosshardt & Watts, 1994; Boyd, Lankford, & et al., 2008). As the importance of standardized testing has increased, studies attempting to identify characteristics of effective teachers have increased. However, a study exists predating the implementation of mass standardized testing (Coleman, 1966). During school integration, Coleman examined the distribution of educational resources to determine its effect on student achievement of poor and minority students. His research found generally the teachers' effect on student achievement was greater than a student's demographics. Current literature found similar school effects on student achievement and improving teacher qualifications may lead to improved results (Boyd, Lankford, & et al., 2008; Carlisle et al., 2011; Nye et al., 2004; Rivkin et al., 2005; Rowan et al., 2002; Sanders & Horn, 1994). The correlation between teacher characteristics and student achievement may be able to predict student achievement (Clotfelter et al., 2006; Xu et al., 2011). Teachers with stronger academic backgrounds may produce students with stronger academic achievement.

While there may be a correlation between teacher characteristics and student achievement, other research disagrees. Some studies suggest researchers are unable to identify the teacher characteristics responsible for one teacher being more effective than another (Ferguson, 1998). In these studies, the analysis of teacher characteristics' effects on student achievement produced little or no evidence of a correlation (Borman & Kimball, 2005; Boyd, Lankford, et al., 2008; Clotfelter et al., 2006; Jepsen & Rivkin, 2009). Value-added models of student achievement suggest some teacher characteristics poorly predict a teacher's effectiveness in the classroom (Aaronson et al., 2007; Clotfelter et al., 2007; Goldhaber, 2007; Goldhaber & Brewer, 1997; Gordon, Kane, & Staiger, 2006; Rivkin et al., 2005). Other research shows teacher characteristics are only weakly correlated with student achievement (Croninger, Rice, Rathbun, & Nishio, 2003; Wayne & Youngs, 2003). This uncertainty of the reliability of a single teacher characteristic is found in other studies (Aaronson et al., 2003; Ballou, Sanders, & Wright, 2004; Hanushek, Kain, O'Brien, & Rivkin, 2005; Rivkin et al., 2005; Rockoff, 2004; Nye et al., 2004). This study suggests if teacher characteristics affect student achievement, it may be difficult to assess and may vary by student (Clotfelter et al., 2006). Even though researchers disagree on the significance of teacher characteristics on student achievement, the literature offers insight on the ways teachers may influence student achievement.

Teacher Recruitment

Determining the effect of teacher characteristics on student achievement may provide guidance to school administrators during the hiring process. School administrators may be able to improve student achievement by selecting teaching candidates with effective characteristics for their school (Boyd, Lankford, & et al., 2008). School administrators may need to analyze applicants with a focus on the teacher characteristics with the greatest effect on student

achievement. The research suggests shifting the emphasis from retention of teachers to the recruitment of teachers may prove to have positive outcomes in public schools (Xu et al., 2011). Student achievement may benefit from school administrators hiring teachers with the best characteristics.

Easily Observed Teacher Characteristics

The literature cites teacher characteristics, which may be more easily observed on a resume or application. Several of these factors appear to have potential to improve the hiring practices of school administrators. As mentioned earlier in this chapter, these teacher characteristics include: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams (Clotfelter et al., 2006).

National Board Certification

Another important teacher characteristic is National Board Certified teachers, who may be more effective than those who are not National Board Certified teachers (Cavalluzzo, 2004; Goldhaber & Anthony, 2005; Vandevort, Amrein-Beardsley, & Berliner, 2004). The National Board Certification process includes a rigorous, standards-based review of a teacher's instructional practices (Darling-Hammond & Rustique-Forrester, 2005). The researchers found the evaluation process for National Board Certification reflected practices with a positive effect on student achievement.

Other studies have found National Board Certified teachers have a greater impact on student achievement in specific categories (Clotfelter et al., 2006; Goldhaber & Anthony, 2005). Teachers who have earned National Board Certification appear to have a greater impact on students from lower-socioeconomic status (Goldhaber & Anthony, 2005). Other studies found a

positive impact in reading only (Clotfelter et al., 2006). Overall, the research revealed positive outcomes for student achievement associated with National Board Certified teachers, but the research varies on which students benefit from this teacher characteristic.

College Attended

Another important teacher characteristic is the undergraduate college attended. Researchers utilize several publications, which rank the most selective undergraduate schools (Clotfelter et al., 2006). While the impact of attending a highly competitive undergraduate program appears to be small and statistically insignificant, teachers who attended a less competitive undergraduate program are associated with lower student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). Even though obtaining a degree from a highly competitive university may not have a large effect on student achievement, obtaining a degree from a less competitive university appears to have a negative effect on student achievement, especially in reading.

Two studies – one in January 2010, the other June 2010 - evaluated the effect of graduates from a University of North Carolina (UNC) institution on student achievement in North Carolina public schools (Henry, Thompson, Bastian, Fortner, Kershaw, Purtell, & Zulli, 2010; Henry, Thompson, Fortner, Zulli, & Kershaw, 2010). The January 2010 study found teachers with UNC undergraduate preparation had a slightly better effect on student achievement in high school End-of-Course exams, elementary school mathematics, and elementary school reading compared to teachers from all other sources (Henry, Thompson, Fortner, & et al., 2010). Teachers with training from a UNC Master of Arts in Teaching program produced results neither better nor worse compared with teachers from all other sources (Henry, Thompson, Fortner, & et

al., 2010). Overall, teachers with UNC undergraduate preparation held a slight advantage over teachers from all other sources in three of the five tested subjects.

Additionally, the January 2010 study identified which individual UNC institutions produced teachers with significant impacts in various subjects when compared with teachers from all other sources (Henry, Thompson, Fortner, & et al., 2010). Overall, the authors found the majority of teachers prepared by an UNC institution produced test scores neither better nor worse than teachers from all other sources with some exceptions. The researchers found teachers who attended specific universities had better student achievement in a variety of subjects (see Table 3).

The June 2010 study compared UNC undergraduate prepared teachers' effects on test score gains against teachers from other licensure portals: (1) out of state undergraduate prepared, (2) lateral entry, (3) North Carolina private undergraduate prepared, (4) unclassifiable, (5) out of state graduate prepared, (6) UNC graduate prepared, (7) visiting international faculty, (8) UNC licensure only, (9) other licensure only, (10) North Carolina private graduate prepared, and (11) Teach for America (Henry, Thompson, Bastian, & et al., 2010). The researchers found Teach for America and North Carolina private graduate prepared teachers outperformed UNC undergraduate prepared teachers in several high school subjects. The researchers found UNC undergraduate prepared teachers outperformed out of state undergraduate prepared, visiting international faculty, and lateral entry teachers in several high school subjects. The researchers found no significant differences in middle school teacher effects with the exception of two areas: (1) Teach for America prepared teachers outperformed in middle school mathematics and (2) UNC licensure only prepared teachers underperformed in middle school reading. In elementary school, the researchers found visiting international faculty outperformed UNC undergraduate

Table 3

UNC Institutions Associated with Higher Student Achievement

University	Subjects
North Carolina State University	High school overall, high school mathematics, & high school science
UNC Asheville	High school mathematics
Fayetteville State University	High school science & high school English
UNC Pembroke	High school science
UNC Chapel Hill	High school science, middle school mathematics, & elementary school mathematics
Western Carolina University	High school English
East Carolina University	Elementary school mathematics & elementary school reading
UNC Wilmington	Elementary school mathematics & elementary school reading
UNC Charlotte	Elementary school mathematics
UNC Greensboro	Elementary school mathematics

prepared teachers in elementary school reading. The researchers found UNC undergraduate prepared teachers outperformed out of state undergraduate prepared teachers in both elementary school math and reading.

Teaching Experience

Teaching experience is one of the most common teacher characteristics analyzed in the literature. Additionally, teaching experience appears to have the most significant correlation to student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). The majority of studies suggest increased teaching experience is associated with increased student achievement in multiple subjects (Clotfelter et al., 2006). When combined with other teacher characteristics, especially licensure exams, experience appears to be more significant (Boyd, Lankford, & et al., 2008). As teachers increase their years of experience, student achievement increases. Some studies attempt to determine the range of experience with the greatest effect on student achievement (Clotfelter et al., 2006). The effects of teaching experience on student achievement appear to plateau between 13 and 26 years. Studies suggest that prior to 13 years of experience the effect appears to increase with experience, after 26 years of experience the effect appears to decrease with experience.

Lack of experience appears to be equally significant in many studies, as inexperienced teachers are found to have a negative effect on student achievement (Clotfelter et al., 2006; Jepsen & Rivkin, 2009). First-year teachers are generally less effective than more experienced teachers, even second-year teachers (Kane et al., 2008; Rivkin et al., 2005; Rockoff, 2004). The attrition of ineffective, first-year teachers may explain the difference in the effect on student achievement of first-year and second-year teachers (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008; Goldhaber, Gross, & Player, 2007; Hanushek et al., 2005; Krieg, 2006). An

increase of inexperienced teachers at a school may lead to a decrease in student achievement (Jepsen & Rivkin, 2009). If efforts to staff hard-to-staff schools result in hiring inexperienced teachers, those efforts may have a negative effect on student achievement.

On the other hand, some studies suggest teaching experience may not have a significant effect on student achievement (Goldhaber & Brewer, 1997; Hanushek, 1996; Kane et al., 2008; Monk, 1994; Wayne & Youngs, 2003). Student achievement growth may not be correlated with teaching experience (Boyd, Lankford, & et al., 2008). Teaching experience explains little of the actual quality variation in student achievement as teachers with the same experience were found to have large differences (Kane et al., 2008; Rivkin et al., 2005). Additionally, teaching experience has an inconsistent effect on students of different grade levels (Monk, 1994). The relationships between experience and student achievement may be too difficult to interpret (Wayne & Youngs, 2003). Teaching experience may not have as great an effect on student achievement as other teacher characteristics.

Another aspect of examining the impact of teaching experience is the growth of the Teach for America program, whose mission is to provide high quality teachers for low-income schools through alternative licensure (Boyd, Lankford, & et al., 2008; Xu et al., 2011). Teach for America candidates typically enter the classroom with no experience. A study of the Teach for America (TFA) program found that experience might not have as great an effect as other characteristics, as TFA teachers may have a greater effect on student achievement than teachers with three or more years experience (Xu et al., 2011). Research suggests the training provided by the Teach for America program may develop effective teacher characteristics (Xu et al., 2011). Additionally, TFA teachers can become even more effective with experience (Boyd et al., 2006).

This may be significant for hard-to-staff schools. The Teach for America program may provide more effective teachers than otherwise available.

Advanced Degrees

Another important teacher characteristic is advanced degrees. Teachers holding advanced degrees were found to have little or no significant effect on student achievement (Clotfelter et al., 2006; Goldhaber & Brewer, 1997; Hanushek, 1996; Kane et al., 2008; Monk, 1994; Wayne & Youngs, 2003). Some studies found teachers with advanced degrees had a negative effect on student achievement (Clotfelter et al., 2006). Even though advanced degrees usually are associated with an increase in salary, they may not result in the expected increase on student achievement.

Teacher Certification

Another important teacher characteristic is teacher certification. In order to become certified, teacher candidates must complete established programs. Typically, certification programs include a course of study with educational pedagogy and content-specific courses, pre-service experience, and a licensure exam. Teachers without certification appear to have a negative effect on student achievement (Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009). Teachers, who are certified, appear to have a significant effect on student achievement, while non-certified teachers appear to have a larger negative effect on student achievement than first-year teachers, but show improvement as they gain experience (Jepsen & Rivkin, 2009). As teachers gain classroom experience, their effect on student achievement appears to improve regardless of certification status.

Licensure Exams

In order to receive teacher certification, most states require teacher candidates to achieve

a minimum score on a licensure exam. Some research shows a positive correlation between teachers with licensure exams and student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). Teachers with lower licensure exam scores, or who experience difficulty in passing licensure exams have a negative effect on student achievement in multiple subjects (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). Licensure exams appear to have larger effects on student outcomes in math (Clotfelter et al., 2006). Licensure exams appear to have potential as a predictive indicator of a teacher's future performance (Boyd, Lankford, & et al., 2008).

However, other studies found little or no significant correlation in their analysis of licensure exams' effects on student achievement (Buddin & Zamarro, 2009; Carlisle et al., 2011; Clotfelter, Ladd, Vigdor, & Diaz, 2004; Ferguson, 1991; Goldhaber et al., 2011; Hanushek, 1996; Hill, Umland, Litke, & Kapitula, 2012). Research found some teachers with low licensure exam scores were associated with positive student achievement, while some teachers with high licensure exam scores were not associated with positive student achievement (Angrist & Guryon, 2004; Goldhaber, 2007). If little or no significant correlation exists, then licensure exams may eliminate potentially successful teachers. This would have a negative impact on the teacher labor market (Angrist & Guryon, 2008; Goldhaber, 2007). Disagreement remains on the significance of the effect of licensure exams on student achievement.

Some significant issues surrounding licensure exams can explain the disagreements. Research appears to be lacking on the correlation between licensure exams and instructional quality (Hill et al., 2012). The Praxis Series is a common licensure exam, but no available data validates its assessment of a candidate's potential in the classroom (Hill et al., 2012). Licensure cut-scores are typically established with item performance or exam-taker performance in mind,

but does not consider actual classroom performance (Hambleton & Pitoniak, 2006; Zieky & Perie, 2006). Additionally, cut-scores vary between states (Hill et al., 2012). Additional concerns about licensure exams compound the differences found in the research.

Some studies suggest alternative assessments for determining placement in the classroom (Hill et al., 2012). The Mathematical Knowledge for Teaching (MKT) instrument could be used by school districts to identify desirable candidates for teaching positions in math, as it has positively predicted student outcomes (Hill et al., 2012; Hill, Rowan, & Ball, 2005; Rockoff, Jacob, Kane, & Staiger, 2008). Teachers with strong MKT scores exhibited effective teacher characteristics in their classrooms associated with improved student achievement (Hill et al., 2012). Implementing the MKT would not leave out teachers with the potential to be successful in their classrooms (Hill et al., 2012). However, the MKT is not complete in its exclusion of poor teachers (Hill et al., 2012). Alternative assessments may provide an opportunity to improve teacher selection.

Some studies have analyzed the effect of standardized tests taken by teachers prior to their undergraduate work (Boyd, Lankford, & et al., 2008). The researchers found SAT scores have a positive correlation to student achievement. The researchers found math SAT scores appear to have a positive effect on student achievement. Identifying teachers with math SAT scores one standard deviation above the mean could lead to positive outcomes in student achievement.

Other Factors Affecting Student Achievement

There may be factors affecting student achievement less easily observed by a school administrator reviewing applications that have the potential for improving student achievement.

School administrators may want to consider these factors as they interview candidates for vacancies.

Impact of Standardized Testing

Studies commonly analyze the effects of individual teacher characteristics on student achievement as measured by standardized testing. Studies suggest high-stakes testing influences teaching to a significant degree (Anagnostopoulos & Rutledge, 2007; Au, 2007; Booher-Jennings, 2005; Firestone, Monfils, Haynes, Polovsky, Martinez, & Hicks, 2004; Smith, 1991; Spillane, Diamond, Burch, Hallett, Jita, & Zoltners, 2002). Some testing may improve the quality of education students receive (Madaus, West, Harmond, Lomax, & Vator, 1992). The accountability associated with standardized testing may have a positive effect on instruction by raising expectations (Darling-Hammond & Rustique-Forrester, 2005). Testing provides immediate student results, which can guide teachers in their instruction (Darling-Hammond, Aness, & Falk, 1995). The benefit for classroom instruction is dependent on how principals and teachers incorporate the new standards and the amount of teaching expertise available in the school (Borko, Elliott, & Uchiyama, 1999; Borko & Stretcher, 2001; Wolf, Borko, McIver, & Elliott, 1999). As long as the data from standardized testing is used to guide and improve instruction, an increase in student achievement may be possible. Standardized testing may have a significant effect on teacher characteristics.

Teacher-Student Relationships

Another important factor is teacher-student relationships. Several studies have suggested a teacher's supportive relationship with their students has a positive effect on student achievement (Curby, Rimm-Kaufman, & Ponitz, 2009; Hamre & Pianta, 2001; Hughes et al., 2012; Hughes, Cavell, & Jackson, 1999; Ladd, Birch, & Buhs, 1999; Meehan, Hughes, & Cavell,

2003; O'Connor & McCartney, 2007; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008).

Research suggests teacher-student relationships may be able to overcome other relevant variables commonly associated with at-risk students (Hughes, Luo, Kwok, & Loyd, 2008; O'Connor & McCartney, 2007). If a student feels comfortable in the classroom, their achievement may increase (Hughes et al., 2012). A positive classroom relationship may have a long-term impact on student achievement.

Professional Development

Another important factor is professional development. Professional development was on par with class time in having a positive effect on student achievement (Bosshardt & Watts, 1994). Studies show professional development that is researched-based, thoughtfully conceived and delivered, and focused on the right things can impact learning (Guskey, 2005). Studies suggest the most successful schools align the needs of their students with the professional development opportunities offered to their teachers (Holloway, 2006; Murphy, 2005). Credit courses may provide a more rigorous learning experience for the teacher (Bosshardt & Watts, 1994). In turn, this may result in more rigorous instruction for their students.

Teacher Evaluations

Another important factor is teacher evaluations. Teacher evaluations are not always available during the interview process, but appear to have a positive effect on student achievement (Darling-Hammond & Rustique-Forrester, 2005). Researchers suggest positive correlations exist between standards-based teacher evaluations and student achievement (Milanowski, Kimball, & White, 2004). When teacher evaluations are aligned with teaching standards, there is a predictive element to the evaluation (Darling-Hammond & Rustique-Forrester, 2005). Teachers with higher ratings on standards-based evaluations are associated with

students with higher scores on standardized tests (Darling-Hammond & Rustique-Forrester, 2005).

Class Size

Another important factor is class size. Class size may have a positive effect on student achievement (Clotfelter et al., 2006). At-risk students may benefit more from smaller classes than other students (Jepsen & Rivkin, 2009; Krueger & Whitmore, 2001). Lower class-sizes may have a more significant effect on African-American students (Krueger, 1999; Krueger & Whitmore, 2001); other studies disagree (Jepsen & Rivkin, 2009). The effect of smaller class sizes on student achievement differs in the literature.

Additionally, Gladwell (2013) suggests small may have as great an impact student achievement as previously believed. Smaller classrooms improve student achievement, only if the teaching style is adjusted to meet the size of the class (Gladwell, 2013). Gladwell (2013) believes teacher quality contributes more to student achievement than class size. Gladwell (2013) recommends focusing on hiring and training better teachers instead of hiring more teachers to reduce class size.

Reducing class size would require hiring more teachers, which may result in hiring more inexperienced teachers. The benefit of reducing class size did not exceed the negative effect of an inexperienced teacher (Jepsen & Rivkin, 2009). Therefore, reducing class size may not benefit students, if inexperienced teachers are hired to create smaller classes. Research found an increase in inexperienced and non-certified teachers following class size reductions (Ross, 1999). Another study found the benefit of having small class sizes was counteracted by the penalty of having inexperienced teachers (Jepsen & Rivkin, 2009). Smaller class sizes may have a positive effect

on student achievement. However, schools experiencing difficulty hiring experienced staff members may not be able to reap the benefits of smaller class sizes.

Teacher-Student Matching

Several studies have raised the question of whether teachers affect students or student affect teachers (Bosshardt & Watts, 1994; Boyd, Lankford, et al., 2008; Clotfelter et al., 2006). Research found the best-qualified teachers were matched with students in high-wealth schools (Clotfelter et al., 2006). Other studies found great teachers were attracted to great schools (Bosshardt & Watts, 1994; Boyd, Lankford, & et al., 2008). Studies found teacher sorting among schools with low performing, low-income, and high-minority schools have the least qualified teachers (Clotfelter et al., 2006; Lankford, Loeb, & Wyckoff, 2002). However, teacher sorting has been shown to lead to biased estimates of the effect of teacher characteristics (Clotfelter, Ladd, & Vigdor, 2010; Goldhaber, 2007). The issue of teacher-student matching may undermine the reliability of studies evaluating the impact of teacher characteristics on student achievement.

Challenges for Low-wealth School Districts

Low-wealth school districts are generally associated with low student achievement. If teacher quality is the most important factor affecting student achievement, this poses concerns over teacher distribution in public schools (Aaronson et al., 2007; Goldhaber, Brewer, & Anderson, 1999; Rivkin et al., 2005; Rockoff, 2004). Much of the research suggests an unequal distribution of effective and ineffective teachers exists among schools (Borman & Kimball, 2005; Boyd, Lankford, et al., 2008; Carlisle et al., 2011; Clotfelter et al., 2006; Goldhaber et al., 2011). Studies have found that low-income, minority students are more likely to be taught by ineffective teachers (Carlisle et al., 2011; Darling-Hammond, 2004; Ferguson, 1998; Kain & Singleton, 1996). The evidence of unequal teacher distribution raises questions about the

magnitude of the disadvantages caused by this issue (Borman & Kimball, 2005; Boyd, Lankford, et al., 2008; Goldhaber et al., 2011). However, some studies have found the distribution of teachers to be equal between schools (Borman & Rachuba, 1999; Rowan et al., 2002). Although some disagreement exists, it appears teacher distribution among schools deserves further study.

Teacher Characteristics

The differences between effective and ineffective teachers may be significant (Boyd, Lankford, & et al., 2008). At-risk students are often matched with ineffective teachers. This combination appears to increase the disadvantages facing students in low-wealth schools. An improvement in the qualifications of teachers in low-income schools may have a significant effect on closing the achievement gap (Boyd, Lankford, & et al., 2008; Rowan et al., 2002). The research suggests experience may not have a significant effect on student achievement in low-income schools (Boyd, Lankford, & et al., 2008). The research was able to identify a trend of improved teacher characteristics in low-income schools during a period of improved student achievement (Boyd, Lankford, & et al., 2008). Although the relationship between the two is not significant, it deserves further consideration.

Teacher Recruitment

School administrators at low-wealth schools may experience difficulty in attracting highly qualified teachers (Jepsen & Rivkin, 2009). It could also be suggested that highly qualified, experienced teachers may be less attracted to low-income schools (Boyd, Lankford, & et al., 2008). The lack of desirable housing and characteristics associated with low-income areas may discourage teachers from accepting positions at schools in these areas (Boyd, Lankford, Loeb, & Wyckoff, 2003). This difficulty has led many school leaders to search for methods to overcome these obstacles. Several school districts have implemented policies with incentives to

attract highly qualified teachers to hard-to-staff schools (Loeb & Miller, 2006). Implementation of incentives may have positive outcomes (Boyd, Lankford, & et al., 2008). However, research suggests relying on teacher characteristics may be detrimental to hiring and may result in poor matches and increase teacher turnover (Liu & Johnson, 2006).

Teacher Retention

Teacher attrition patterns found in the studies suggest public schools are losing their best teachers (Ehrenberg & Brewer, 1994, 1995; Ferguson, 1991; Ferguson & Ladd, 1996; Goldhaber, 2007; Strauss & Sawyer, 1986; Summers & Wolfe, 1975). However, this may be a false assumption based on studies suggesting easily observable teacher characteristics may be weakly correlated with student achievement (Aaronson et al., 2007; Clotfelter et al., 2007; Goldhaber & Brewer, 2001; Gordon et al., 2006; Hanushek, 1986, 1997). The best-prepared teachers were more likely to leave high poverty and minority schools (Lankford et al., 2002; Podgursky, Monroe, & Watson, 2004). Studies found teachers working in schools with a high percentage of African-American students are more likely to transfer (Goldhaber et al., 2011; Hanushek, Kain, & Rivkin, 2004; Jackson, 2009). Effective teachers may be more likely to leave a low-income school (Goldhaber et al., 2011). The greatest turnover is in urban and rural areas with half or more students receiving free or reduced lunch (Graziano, 2005). As teachers gain experience and build their resume, they appear to be more likely to transfer to schools with more advantages (Goldhaber et al., 2011; Goldhaber & Hansen, 2010; Hanushek et al., 2004). The ability of a low-income school to retain their best teachers may have an impact on student achievement (Goldhaber et al., 2011). If the best teachers are more likely to leave low-income schools, teachers will be unevenly distributed among schools (Goldhaber, Destler, & Player, 2010; Guarino, Santibanez, & Daley, 2006; Hanushek et al., 2004; Lankford et al., 2002). As

teacher leave low-income and low-performing schools, the disadvantages existing in these schools may compound to deter future candidates from accepting positions. This situation may increase the challenges facing low-income schools.

However, some studies suggest effective teachers may be more likely to stay in their current positions (Goldhaber et al., 2011; Krieg, 2006; West & Chingos, 2009). A successful teacher may be satisfied with their current position and more likely to stay than an unsuccessful teacher (Goldhaber et al., 2011). As their ability to teach increases, their desire to transfer may decrease (Krieg, 2006). If an effective teacher does transfer, they may be more likely to transfer within district (Goldhaber et al., 2011). Studies suggest positive relationships between school administration and teachers within schools have a significant effect on a teacher's decision to stay (George, George, Gersten & Grosenick, 1995; Ingersoll, 2001; Johnson, Birkeland, Kardos, Kauffman, Liu, & Peske, 2001; Singh & Billingsly, 1996). Other studies suggest teachers who are more socially connected in their community and have ties with local people outside of the school are less likely to leave (Boyd et al., 2006; McPherson, Popielarz, & Drobnic, 1992; Mehra, Kilduff, & Brass, 2001; Thomas, 2007). Low-income schools may not struggle with retaining their most effective teachers as other studies suggest.

Additionally, the research on retention examines ineffective teachers in low-income schools. It appears turnover in low-income schools may benefit the school (Goldhaber et al., 2011). The high rates of turnover in low-income schools suggest ineffective teachers are leaving, too. Removal of ineffective teachers may provide an opportunity to improve student achievement by hiring better teachers. School administrators may investigate methods to maximize this benefit of a high turnover rate (Goldhaber et al., 2011). Ineffective teachers, who choose to leave the profession, may improve retention of effective teachers. The issue of retaining high quality

teachers remains an important issue (Baker-Doyle, 2010). This appears to be an important area for further investigation for low-income school districts. Effective policies related to this issue may prove to have an effect on student achievement.

Teach for America

Another aspect of examining the challenges facing low-wealth districts is the growth of the Teach for America program. The Teach for America (TFA) program's mission is to provide high quality teachers for low-income schools through alternative licensure (Boyd, Lankford, & et al., 2008; Xu et al., 2011). Many schools associated with TFA have difficulty recruiting highly qualified teachers (Boyd, Lankford, & et al., 2008). In many cases, TFA teachers may have better credentials than others available (Boyd, Lankford, & et al., 2008). While TFA candidates may be attractive to many low-income schools, school administrators may be hesitant to place them in classrooms with the greatest needs (Xu et al., 2011).

The Teach for America program trains candidates with no prior experience. Studies show inexperienced teachers are generally less effective than more experienced teachers (Rivkin et al., 2005; Rockoff, 2004). Concerns about Teach for America teachers' lack of experience are found in the literature (Rivkin et al., 2005; Rockoff, 2004; Xu et al., 2011). Candidates are expected to complete at least two years in the classroom. Research found a TFA teacher's tenure might end just as they have gained the experience necessary to significantly affect student achievement (Rivkin et al., 2005; Rockoff, 2004). TFA teachers appear to have a significant effect on student achievement (Xu et al., 2011). TFA teachers may have a more significant effect on student achievement at the high school level compared to non-TFA teachers (Xu et al., 2011). In math and science, the difference appears to be significant, but in reading, it does not (Glazerman, Mayer, & Decker, 2006; Xu et al., 2011). Some studies suggest TFA teachers have a greater

effect on student achievement when compared with non-TFA teachers (Xu et al., 2011). Teach for America teachers appear to offer an effective option for low-income schools.

Standardized Testing in Low-wealth Districts

Another aspect of the challenges facing low-wealth districts is standardized testing. The research suggests standardized testing may have differing impacts on low-income schools (Darling-Hammond & Rustique-Forrester, 2005). Testing provides a measurement of equality of educational opportunity (Education Trust, 2004; Public Education Network, 2002). Low-performing schools may remain invisible without testing (American Psychological Association, 2004). Testing would identify schools not serving students. Accountability strategies using achievement targets for schools as the basis for allocating resources may be more productive than other models (O'Day, 2002; Roderick & Engel, 2001). This support may provide a means to improve student achievement (Darling-Hammond & Rustique-Forrester, 2005). National Assessment of Educational Progress (NAEP) tests indicated improvements on student achievement in urban areas, even as its populations of minority, low-income, and limited English-speaking students grew (Baron, 1999; Wilson, Darling-Hammond, & Berry, 2001). Proactive initiatives focused on using standardized testing to inform instruction rather than to implement sanctions could serve as models for other low-income schools and districts (Darling-Hammond & Rustique-Forrester, 2005). Where effective initiatives were initiated, testing appeared to have positive effects on student achievement.

However, the research reports standardized testing may have a negative effect on low-income schools (Darling-Hammond & Rustique-Forrester, 2005). Schools serving low-income students are more likely to be designated as low performing (Ladd & Walsh, 2002). Teachers are leaving low-performing schools due to sanctions placed on schools with low-performance on

standardized testing (DeVise, 1999). Research suggests the North Carolina accountability system negatively affected schools serving low-performing students by decreasing the schools' ability to retain teachers (Clotfelter, Ladd, Vigdor, & Diaz, 2004). This may lead to an increased challenge for low-income schools. The inability to hire qualified teachers may cause a decrease in student achievement and increase possible testing related sanctions (Darling-Hammond & Rustique-Forrester, 2005). The NC accountability system was found to increase the need for low-performing schools to hire more teachers, who tended to be inexperienced (Clotfelter, Ladd, Vigdor, & Diaz, 2004). Teachers leaving the profession stated testing was a major factor (Darling-Hammond & Wise, 1985; Loeb, Darling-Hammond, & Luczak, 2005; Sykes, 1983). The NC accountability system was found to have made teaching a less attractive occupation, even for teachers in high-performing schools (Clotfelter, Ladd, Vigdor, & Diaz, 2004). The impact of standardized testing appears to have affected all schools. However, the impact on a low-income school's ability to hire qualified staff appears to be significant.

Class Size

A teacher's effectiveness may be increased by characteristics of their classroom more than their teaching ability. Class size may have a positive effect on student achievement (Lazear, 2001; Clotfelter et al., 2006). At-risk students may benefit from smaller classes more than other students (Angrist & Lavy, 1999; Borman & Kimball, 2005; Jepsen & Rivkin, 2009; Rivkin et al., 2005). The effect of smaller class sizes may vary dependent upon the school. A school would need to increase the number of personnel to achieve smaller class sizes. This would require hiring additional teachers. The benefit of having small class sizes was counteracted by the penalty of having inexperienced teachers (Gladwell, 2013; Jepsen & Rivkin, 2009). Smaller class sizes may have a positive effect on student achievement. However, schools experiencing

difficulty hiring experienced staff members may not be able to reap the benefits of smaller class sizes (Jepsen & Rivkin, 2009).

Hiring Practices of School Administrators

School administrators have numerous responsibilities with the hiring of an effective staff being the most important (Bolz, 2009; Bredeson, 1985; Mason & Schroeder, 2010; Natter & Kuder, 1983; Peterson, 2002; Place & Drake, 1994; Robbins & Alvy, 2003; Rothman, 2004). Whether positive or negative, the impact of hiring practices may mold the culture of the school (Bennis, 1991; Robbins & Alvy, 2003). School administrators are dependent on their staff to accomplish the school's goals. The other job responsibilities may become more difficult to accomplish with an inferior staff. Additionally, a principal's success may be determined by his or her hiring decisions (Temes, 2002). Principals recommend candidates for teaching vacancies. Utilizing this authority at the time of teacher selection may enhance the principal's job performance (Temes, 2002). Principals who do not view this process as an essential part of their job may encounter difficulties.

Another factor in hiring is the impact on school improvement. Several studies have found a direct link between effective teaching and increased student achievement, therefore refocusing efforts on hiring practices may result in positive outcomes for schools (Danielson & McGreal, 2000; Fullan, 2001; Kersten, 2008; Marzano et al., 2001; Stronge, 2002; Tucker & Stronge, 2005). Hiring better teachers may result in better student achievement (Rivkin et al., 2005; Rutledge, Harris, & Ingle, 2010; Sanders & Horn, 1998). The relationship between highly qualified teachers and positive student outcomes appears to be strong (Malen, Croninger, Muncey, & Redmon-Jones, 2002; Rutledge, Harris, & Ingle, 2010). Hiring the best teachers appears to be a reliable method of improving a school. Papa and Baxter (2008) believe hiring

principals who can recruit the best teachers for their school is a cost-effective method of school improvement. School leaders should work to improve their human resource skills. Identifying the characteristics of effective teachers is required to become effective teacher recruiters.

During the hiring process, a school administrator cannot determine the success of a teacher candidate. As Mason and Schroeder (2010) suggest, school administrators must reduce the uncertainty of hiring teachers to ensure their schools' success. No candidate is a guaranteed success. School administrators should identify the hiring criteria that will generate the greatest effect on student achievement. Focusing the hiring process on criteria known to be effective may increase the opportunity for success (Kersten, 2008; Mason & Schroeder, 2010; Papa & Baxter, 2008; Temes, 2002). Researchers have explored numerous criteria used in the hiring process (Kersten, 2008; Mason & Schroeder, 2010; Papa & Baxter, 2008; Temes, 2002). A candidate's preparation for the teaching field and undergraduate grade point average were near the top (Papa & Baxter, 2008; Temes, 2002). Students with excellent grade point averages were able to navigate the bureaucracy of a university and should be able to adapt to the bureaucracy of public schools (Temes, 2002). Identifying the best-prepared teacher candidates requires school administrators to become familiar with their regional teacher preparation programs. Making strong connections within these programs could yield a higher percentage of successful hires. All of this appears to be self-evident, but may be overlooked by principals.

A new staff member can be the lift a school needs or an anchor that hampers improvement. Improving teacher quality should be the emphasis of a school improvement plan (Kersten & Israel, 2005; Rutledge, Harris, & Ingle, 2010; Temes, 2002). Hiring high quality teachers offers the most direct method of school improvement (Temes, 2002). Principals must utilize this leverage to hire the best teachers. Excellent teachers make change possible, while

poor teachers make change impossible (Mason & Schroeder, 2010). Research suggests a bad hire cannot be overcome by professional development (Jones, 2008). Principals must keep this in mind during every interview conducted to find new staff members. A principal's ability to improve their school depends on hiring great teachers.

Research recommends establishing a process for hiring new staff members that ensures only high quality (Kersten, 2008; Mason & Schroeder, 2010). There are no means to guarantee hiring a great teacher, but steps can be taken to improve that likelihood (Mason & Schroeder, 2010). Mason and Schroeder (2010) believe principals should hire soon after a vacancy is created. This will provide the advantage of a greater pool of candidates. They also suggest that effective hiring will be different for each school as the school demographics, school type, and principal experience may value a different set of teacher qualities. Kersten (2008) found that principals with knowledge of best practices in the hiring process held an advantage over their peers. Kersten (2008) believes principals with these understandings will hire more effective teachers than other principals.

Hiring as a Method of School Improvement

School improvement efforts have spawned numerous variations to improve low-performing schools. Research suggests some improvement methods are misguided (Temes, 2002). Several school improvement models want to restructure the school itself. This method ignores the people who facilitate learning. Teachers have the most direct impact on student learning and should be the focus of school reform efforts. The researcher believes better teachers have a greater effect on student learning than smaller classes. Additionally, smaller class size comes with a larger price tag than improving teacher characteristics. Individuals with the characteristics to be the best teachers are responsible for positive school performance. This

method of school improvement may offer increased opportunities to improve student learning and should be studied further.

A school improvement method based on hiring better teachers may have problems attracting teachers to low-performing schools (Papa & Baxter, 2008). The researchers believe school improvement policies should consider the administrator's role in leading the school. The researchers suggest quality principals attract quality teachers. The researchers suggest school improvement policies should consider increasing an administrator's ability to hire effective teachers. They believe policies must address the inequity of teacher distribution between schools. Incentive programs may increase the ability of low-performing schools to hire quality teachers.

Futernick (2010) is concerned the number of failed school improvement plans may lead the public to believe the obstacles existing in low-performing schools may be too great to overcome. If this conclusion is reached, then low-performing schools will continue to struggle. Policies should focus on improving the system that creates low-performing schools. Any positive change will not be sustained without policies intended to support change over the long run. The conditions that led to the school's original failure will continue to plague the school. Successful school improvement plans were customized to fit the needs of the school. Replicating the success will be determined by the ability to adjust a successful improvement model to the school's needs. Systems will not change until the conditions responsible for the failed system are addressed.

Previous Efforts to Improve Teacher Quality

Another aspect of challenges facing low-wealth school districts is previous efforts to improve teacher characteristics, as addressed in the No Child Left Behind (NCLB) legislation. The intent of NCLB was to require schools to hire teachers with the skills required to provide quality instruction (Beyer & Johnson, 2005; Mosely, 2006). Research suggests teacher quality

has one of the highest impacts on student learning (Stronge, 2002). The intent of NCLB is congruent with the research, but may be contrary to practice. No additional funding is provided, nor policies to level the playing field for low-performing schools (Stronge, 2002). Therefore, it may be difficult for schools with the greatest need of highly qualified teachers to hire a staff that meets the criteria.

Education leaders have urged school administrators to remove ineffective teachers (Sharpton & Klein, 2009). Updated versions of NCLB introduce options for corrective action for school not meeting expected student achievement. All four options for corrective action require the current principal to be replaced. Three of the four require no more than fifty percent of the current staff will be rehired. Studies suggest these corrective actions may have a negative impact on the school (Allensworth, Ponisciak, & Mazzeo, 2009; Hess, 2003; Rice & Croninger, 2005; Rice & Malen, 2003). The social network in the school may be destroyed and create issues related to a lack of trust among the staff (Hess, 2003; Rice & Malen, 2003). An Education Trust report (2008) found numerous 'mis-assignments' in low-performing schools. The inability to hire quality teachers could lead a low-performing school to face further sanctions (Education Trust, 2008). Low-performing schools should be given advantages to assist in hiring a quality staff (Futernick, 2010). Principal leadership appears to be a common attraction for quality teachers. This must be considered when evaluating the leadership of a low-performing school (Education Trust, 2008). Can the current leadership attract the teachers required to improve student learning?

The following case studies provide examples of two of the most prominent efforts to improve teacher quality, removing ineffective teachers and providing financial incentives.

Central Falls High School, Rhode Island

An example of a school district taking steps to remove the staff of a low-performing school is found in Central Falls, Rhode Island. Superintendent Frances Gallo made the recommendation to remove an entire staff of teachers at Central Falls High School, which stunned the staff and community (Stanglin, 2010). The author reports the manner in which the changes were implemented may have discouraged qualified teachers from applying for the vacancies. Efforts intended to improve student achievement may have been hindered by the negative publicity. Their student achievement data supported evidence that a change was needed. No one would argue ineffective teachers were part of the Central Falls staff. The decision gained support from leaders in Washington, DC (Sanchez, 2011; Stanglin, 2010). However, federal policies do not recommend steps to staff schools after a low-performing staff has been removed.

One year later, the status of Central Falls High School has not improved (Sanchez, 2011). The author found more than one out of every four new teachers hired after the change have left. An increase in in-school suspension could be contributed to a greater number of inexperienced staff members, who are not skilled in classroom management. Additionally, established relationships between students and staff were sacrificed during the staff purge. An existing problem might have been made worse by this decision, as many of the new hires are not highly qualified. The author believes the culture of low-expectations was magnified by the dismissal of the entire staff. It may take years for the school to recover from this decision. Attracting new highly qualified staff will present an enormous challenge. Steps were taken to dismiss the entire staff of a low-performing high school without a plan to replace the staff with better teachers. The decision impressed national leaders without accomplishing its intended purpose. Great teachers are still required to improve student achievement.

The structures in low-performing schools should be evaluated as much as the teachers (Futernick, 2010). This may lead to better student performance. The environment must be conducive to effective teaching and learning (Futernick, 2010). Once the structure is secured, then teachers who are not performing should be relieved of their assignment (Futernick, 2010). Removing an entire staff of teachers without addressing the structural faults of a school is like prescribing medicine to cure the symptoms and ignoring the virus (Futernick, 2010). In some instances, policies may have reduced the pool of teacher candidates (Rutledge, Harris, & Ingle, 2010). The focus should be placed on finding effective teachers who fit the needs of the low-performing school.

Guilford County Schools

Another effort to improve teacher quality is providing financial incentives to recruit effective teachers. In 2006, Guilford County Schools introduced Mission Possible, an effort to encourage successful teachers to transfer to low-performing schools. Guilford County Schools faces issues of staffing ranging from teacher shortages, teacher turnover, and poor teacher quality in some of its schools (Rowland, 2008). During one school year, a middle school did not have a certified math teacher on staff (Abramson, 2006). In a low-performing school, this may have compounded existing problems. The goal of improving student performance becomes more challenging without a highly qualified staff (Rowland, 2008). Guilford County Schools wanted to develop a policy that would address inequities in teacher distribution by offering financial incentives to teach in low-performing schools (Rowland, 2008). This policy provided assistance to hire the effective teachers these schools desperately need (Rowland, 2008). Guilford County Schools listened to teachers and their recommendations would become the foundation for the

Mission Possible policy. Effective teachers may work in low-performing schools, if the conditions are right. These incentives could be the answer to increasing student achievement.

In 2006, Guilford County Schools identified twenty low-performing schools to serve as the initial Mission Possible schools (Rowland, 2008). The Mission Possible initiative provided four components to the twenty low-performing schools: (1) salary bonuses for recruitment and retention of teachers and principals, (2) professional development, (3) performance accountability and (4) structural support (Rowland, 2008). In the month after Mission Possible was approved, the district had 174 applicants to teach math, compared to seven the year before (Klein, 2007). However, many of Mission Possible teachers did not receive the maximum bonus for meeting student achievement expectations, a total payout of \$268,250 was spent compared with \$1.2 million allocated by the district (Benscoter, 2007; Guilford County Schools, 2007). The Mission Possible program successfully retained 87 percent of teacher returned for the following school year (Guilford County Schools, 2008). Guilford County Schools officials believe the extra pay and professional development was responsible for the retention rates (Rowland, 2008).

Mission Possible is viewed as a promising reform effort due to its focus on the most difficult schools to staff (Rowland, 2008). The author believes Guilford County Schools should have worked closer with the local teachers' association to develop teacher buy-in, as this may have resulted in a more successful first year. In order to build on their initial successes, the author believes Guilford County Schools will need to secure long-term funding for the Mission Possible program. The author believes efforts to improve teacher quality at low-performing schools depend on a comprehensive communication plan to share their successes with other schools, districts, and states.

These case studies provide examples of two of the most prominent efforts to improve teacher quality in low-performing schools, removing ineffective staff and providing financial incentives to recruit effective teachers. Neither effort has been fully realized and deserves further study.

Good Teachers Leaving

In low-wealth districts, efforts to recruit and retain highly qualified teachers are falling short of their intended goals. In fact, they may be harming efforts to improve (Futernick, 2010; Kersten, 2008; Temes, 2002). Research suggests new teachers with the highest test scores are twice as likely to leave the classroom (Alliance for Excellent Education, 2005). The loss of great teachers occurs most in the districts that need great teachers most (Futernick, 2010). These statistics are alarming. Great teachers are willing to take jobs in low-performing schools. The problem is many do not stay in those jobs. School improvement takes time and continuity. Turnover hurts these efforts to improve. Other options must be implemented to keep our best teachers in the classrooms that need them.

Principals as Recruiters

Research suggests good principals would serve in low-performing schools with good teachers, and good teachers would serve in low-performing schools with a good principal (Gladwell, 2002). One author recommended allowing a principal to assemble a staff of highly qualified teachers during the year prior to starting as principal, the assembled team would go to the school together (Gladwell, 2002). This would make the challenge less daunting as the teachers would be surrounded by other highly qualified teachers (Gladwell, 2002). A team of highly qualified teachers with the shared level of high expectations may be able to overcome the existing school culture and make lasting change (Gladwell, 2002). If an increased level of

standards and expectations could be established for teachers, then more young professionals would be attracted to the profession (Temes, 2002). The study suggests high-qualified teachers would be more attracted to a culture of elite professionalism than increased salaries (Temes, 2002). Temes (2002) believes as a school earns a reputation of being an elite institution, its cost of employment will decrease.

Another study suggests hiring principals who are skilled at hiring effective teachers is a cost-effective method of improving student achievement (Papa & Baxter, 2008). Research found teachers consistently listed a supportive administrative staff and an effective team of committed teachers would make a positive difference when considering a vacancy in a low-performing school (Futernick, 2007). The study believes the prospect of working with a strong group of team-oriented teachers and a supportive administration would be enough to attract teachers to work in low-income schools (Futernick, 2007). Futernick (2007) believes “excellence loves company.” The opportunity to work with other excellent teachers in a professional environment would be a strong attraction to teachers who may be able to make a significant and lasting change in low-performing school (Futernick, 2007).

Studies suggest having the right principal is key to improving a school’s performance (Futernick, 2007). Some principals may make matters worse by alienating staff, while effective principals can build a team by developing trust and loyalty. Principals should recruit teachers with the potential for leadership and work to develop leadership among their staff. An effective principal may not be able to accomplish long-term change, if they cannot sell the idea of a team concept to candidates. Many teachers transfer to other schools because they want to be part of a school that works. A principal committed to selecting teachers who are the best-fit are able to make significant change in their school.

Summary

Teachers can significantly influence student achievement (Aaronson et al., 2007; Kane et al., 2008; Rivkin et al., 2005; Rockoff, 2004; Sanders & Rivers, 1996). Multiple studies have developed effective research models and provided good data to analyze how a variety of teacher characteristics affect student achievement (Boyd et al., 2006, Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008). Teacher experience appears to have a significant correlation to student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). However, some of the research indicates small or no correlation between teacher characteristics and student achievement (Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009).

Much of the research suggests an unequal distribution of effective and ineffective teachers among poverty levels of schools (Carlisle et al., 2011; Clotfelter et al., 2006; Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Goldhaber et al., 2011). School administrators at low-wealth schools may experience difficulty in attracting highly qualified teachers (Jepsen & Rivkin, 2009). Additionally, as teachers gain experience and build their resume, they appear to be more likely to transfer to school with more advantages (Goldhaber et al., 2011; Goldhaber & Hansen, 2010; Hanushek et al., 2004). Standardized testing may have contributed to this situation, as teachers leaving the profession have stated that testing was a major factor in their decision (Darling-Hammond & Wise, 1985; Loeb et al., 2005; Sykes, 1983).

Principals may be able to make a difference as research has described hiring an effective staff as the most important of these responsibilities (Bolz, 2009; Bredeson, 1985; Mason & Schroeder, 2010; Natter & Kuder, 1983; Peterson, 2002; Place & Drake, 1994; Robbins & Alvy, 2003; Rothman, 2004). Hiring decisions may be the difference between a great school and a

school in need of reform (Mason & Schroeder, 2010). Research suggests hiring principals who are skilled as hiring effective teachers is a cost-effective method of improving student achievement (Papa & Baxter, 2008). If a principal makes a commitment to selecting teachers who are the best fit for the students and school, they may be able to make significant change in their school (Futernick, 2007).

This literature review has addressed teacher characteristics with a positive effect on student achievement in low-wealth school districts. The information generated by the analysis may be helpful to school administrators in their application screening and interview process of teacher candidates for vacancies. Hiring teachers with effective characteristics may lead to improved student achievement.

CHAPTER THREE: METHODOLOGY

The purpose of this study is to identify teacher characteristics with a significant effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural southeastern North Carolina. The information generated by the analysis may be helpful to school administrators in their evaluation of teacher candidates for English vacancies.

Chapter three outlines the research methodology used to conduct the multiple linear regression to study the correlation for examining the relationship between teacher characteristics and student achievement. First, the chapter provides an overview of the research questions and on the use of multiple linear regression approaches for undertaking analyses in our context. This is followed by a description of the research questions and hypotheses for the study. Next, the chapter gives a thorough description of the research design, which includes: (a) criteria used for study selection, (b) operational definitions of the constructs being studied, (c) description of instruments used to measure the constructs in various studies, (d) the processes used to locate data, and (e) a description and table of the identified data. This is followed by a description of the coding processes used in documenting pertinent data from the study. The chapter concludes with a description of the multiple linear regression processes used in analyzing the data and the conclusions to be drawn from the analysis of the statistics generated from the multiple linear regression.

Research Questions

The multiple linear regression approach was used to address the following research questions:

1. What is the nature of teacher characteristics for English I teachers in North Carolina low-wealth school districts in Region 4?

The second question to be addressed was pending the availability of sufficient data for each of the identified teacher characteristics.

2. What is the effect size of specific teacher characteristics on student achievement on North Carolina End-of-Course English I exams in low-wealth districts?

The third question to be addressed was pending the availability of sufficient data for each of the identified teacher characteristics.

3. What teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams, have the greatest effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth districts and how can these commonalities be used to improve school administrators' ability to identify and recruit highly effective teachers?

Multiple studies have developed effective research models and provided data to analyze how a variety of teacher characteristics affect student achievement as measured by standardized testing (Boyd et al., 2006, Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008). Teaching experience appears to have a significant correlation to student achievement as measured by standardized testing (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006).

However, some of the research indicates small or no correlation between teacher characteristics and student achievement as measured by standardized testing (Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009).

Hypothesis

The null hypothesis assumed there were no correlation between teacher characteristics and student achievement as measured by standardized testing. The research alternative hypothesis proposed the synthesis of research would show a nonzero significant effect between specific teacher characteristics and student achievement as measured by standardized testing.

Research Design

Variables and Model Specification

Each year, the North Carolina Department of Public Instruction administers End-of-Course (EOC) exams for a variety of subjects, including English I. Additionally, English I is a requirement for high school graduation. In the case of this study, the dependent variable is student achievement as measured by standardized test scores on the 2011 North Carolina EOC English I exam. The North Carolina English I EOC exam is created using a development process involving experts in the field (NCDPI, 2010). North Carolina English I teachers develop test items and submit them for an item analysis. A panel of testing experts, who edit accepted questions for field-testing, vets the items. Bias review is conducted and equivalent and parallel forms are assembled. A final review of tests is conducted before administering a pilot test. The pilot test is scored and results are analyzed to establish standards. Finally tests are administered a fully operational. The entire process may take 44-49 months.

The results from the English I EOC are reported in two ways - a student scale score and an achievement level. A number assigned to their performance on the English I EOC represents a student's scale score. The North Carolina Department of Public Instruction uses student scale scores to establish four achievement levels. An achievement level four is defined as superior performance, an achievement level three is consistent mastery, an achievement level two is

inconsistent mastery, and an achievement level one is insufficient mastery. Additionally, achievement levels three and four are defined as proficient, while achievement levels one and two are defined as non-proficient.

Scores on the 2011 North Carolina End-of-Course English I exam were used to determine the relationship between teacher characteristics and student achievement. The dependent variable for this study was student achievement as measured by the achievement level on the 2011 North Carolina English I EOC. The dependent variable was relevant to the study, having been used by other researchers (Xu et al., 2011, pp. 456-457).

The study provided an estimated effect size for multiple teacher characteristics on standardized test scores. The teacher characteristics served as the independent, or explanatory variables. The teacher characteristics for study were: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams. The independent, or explanatory, variables were relevant to the study, having been used by other researchers (Clotfelter et al., 2006).

Our model utilized student fixed effects. It should be noted that, due to the lack of survey data, we were unable to control some unobserved factors that might affect the interpretation of our estimated teacher characteristic effect. For example, schools may provide additional resources to effective teachers. If this is the case, policymakers should take into account the added 'cost'. As another example, a school may implement Professional Learning Communities as a method for teacher collaboration, which may lead to positive outcomes for student achievement.

Defining Constructs

One of the keys to conducting a successful multiple linear regression and avoiding

possible bias was ensuring that all constructs analyzed were clearly defined. Researchers have used a variety of methods to define and measure teacher characteristics and their effects on student achievement (Boyd et al., 2006; Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008). Prior to conducting the analysis of research, these key constructs were defined through a review of literature and defined operationally.

Student achievement data obtained from standardized test results was used as the measure of teacher effectiveness. The justification for the use of such data in measuring teacher effectiveness can be found in the work of Clotfelter et al. (2006). Student achievement data are reported most often from state level standardized assessments as part of state and federal accountability models. The possible values reported are achievement levels, one through four.

The defining of teacher characteristics in a concrete and descriptive manner was vital to the success of this multiple linear regression. After reviewing the variety of teacher characteristics qualities by categories or themes, the following teacher characteristics were selected for this analysis: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams (Clotfelter et al., 2006). After establishing the definitions of teacher characteristics and student achievement, the criterion for the selection of school districts included in the multiple linear regression were established and the coding protocol developed.

Definitions of the independent variables, teacher characteristics, were based on the work of Clotfelter et al. (2006) with the exception of college attended, which follows the work of Henry, Thompson, Fortner, and et al. (2010).

National Board Certification was defined as a teacher with National Board Certification or not. National Board Certification was identified in the teacher level dataset.

College attended was defined as University of North Carolina undergraduate or all other sources, such as out-of-state, private, or lateral entry. College attended was identified in the teacher level dataset.

Teaching experience was defined as a range of years, as follows: 0 years, 1-2, years, 3-5 years, 6-12 years, 13-20 years, 20-27 years, and 27 or more years. Teaching experience was identified in the teacher level dataset.

Advanced degrees was defined as a teacher holding an advanced degree or not. Advanced degree was identified in the teacher level dataset.

Teaching certification was defined as a teacher holding certification or not. Teaching certification was identified in the teacher level dataset.

Teacher licensure exam score was defined as one standard deviation or more above mean, within one standard deviation of mean, or one standard deviation or more below mean. Teacher licensure score was identified in the teacher level dataset. The mean was generated from all results in the dataset.

Definition of the dependent variable, student achievement, was based on the work of Xu et al. (2011). Student achievement was defined by a student's achievement level on the 2011 North Carolina English I EOC. Student achievement was identified in the student level dataset.

Locating the Datasets

After IRB approval, this researcher requested datasets from the North Carolina Education Research Data Center. The student-level data file, "End of Course Tests", was coded and entered into a spreadsheet. The student's exam scale score, or raw score, achievement level, and the student's class membership was included. The student's classroom membership data identified the student's teacher on the classroom-level data file, "Student Activity Report Personnel Data".

This data file provided a random teacher identification number that allows the researcher to connect the student data to several teacher-level data files. These files included data related to teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams. This was coded and entered into the spreadsheet with the students identified by the classroom membership. After being accurately entered into the spreadsheet a multiple linear regression analysis was conducted. The outcomes of the analysis were analyzed and reported.

Utilizing North Carolina Department of Public Instruction's *Low Wealth Ranking* (2013), the study identified the ten counties in North Carolina were identified as having the highest low-wealth status. Other counties in North Carolina had significant increases in wealth percentage and did not meet the criteria for inclusion in the study. Additional counties were eliminated from consideration as they were located outside of Region 4 or their student population exceeded 10,000 students. School districts in these counties were rejected for one or more of the following reasons:

1. The district was not located in a county in the top 10 of low-wealth counties.
2. The district was not located in Region 4.
3. The district's student population exceeded 10,000 students.

After the elimination of these districts, a total of five remained and were included in the multiple linear regression. The school districts selected for inclusion were: Columbus County Schools, Whiteville City Schools, Hoke County Schools, Richmond County Schools, and Scotland County Schools. These districts are located in the same geographic area and share commonalities relative to their low-wealth status, student demographics, and population.

Coding Procedures

A coding protocol was established according to the guidelines provided by Xu et al. (2011), Henry, Thompson, Fortner, and et al. (2010), and Clotfelter et al. (2006). This consisted of a two-part coding process, which encoded the dependent and independent variables. The dependent variable was coded for student achievement levels on the 2011 North Carolina End-of-Course English I test. Student achievement levels represented the proficiency level defined by the student's scale score. The student achievement levels were coded as level 1, level 2, level 3, or level 4.

The independent variables were coded for the following teacher characteristics: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams.

- National Board Certification represented a classroom teacher's completion of National Board Certification. It was coded as yes or no.
- College attended represented the college attended by the classroom teacher. It was coded as UNC undergraduate or all other sources.
- Teaching experience represented the number of years of classroom experience. It was coded as various ranges: 0 years experience, 1-2 years experience, 3-5 years experience, 6-12 years experience, 13-20 years experience, 20-27 years experience, or 27 or more years experience.
- Advanced degree represented a classroom teacher's completion of a master's or doctoral degree. It was coded as yes or no.
- Teacher certification represented the classroom teacher's certification status. It was coded as certified or non-certified.

- Licensure score represented the classroom teacher's score on the state licensure exam required for certification. It was coded as one standard deviation or more above mean, within one standard deviation of mean, or one standard deviation or more below mean.

Coding of Empirical Findings

In general, the effect size for regression is the estimated regression coefficient (estimated beta). The empirical findings were reported based on the statistical regression analyses output.

Ensuring Coding Reliability

In order to ensure reliability in the coding process, the researcher coded all studies twice.

Analysis of Effect Size

Descriptive graphical displays of the distribution for each of the explanatory variables and the dependent variable were provided. Summary statistics were computed for each of the explanatory variables and the dependent variable.

In order to assess the statistical associations between student achievement and teacher characteristic, procedures based on regression analyses were used. Specifically, we used multiple.

Multiple regression analyses were used to draw conclusions about teacher characteristics (explanatory variables) and student achievement (response variable) on the North Carolina End-of-Course English I exam. The independent variables included: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams. Research has used these teacher characteristics to explain student achievement (Clotfelter et al., 2006). Prior to regression analyses, Pearson's correlation

coefficient that measures the strength and direction for linear association between the quantitative variables in our study were presented.

The dependent variable was treated in three ways. First, students' achievement levels on the North Carolina End-of-Course English I exam were used for the multiple linear regression analyses. Secondly, students' proficiency statuses on the North Carolina End-of-Course English I exam associated with each teacher were used for the multiple linear regression analyses. Finally, the students' scale scores on the North Carolina End-of-Course English I exam were used for multiple linear regression analysis. This was calculated using student level data.

Assumptions

This study was based on several assumptions.

- One assumption was teacher quality can be measured.
- Another assumption related to the ability of a standardized test, such as the North Carolina End-of-Course English I exam, to measure student knowledge.
- In this study, it was an assumption that the explanatory variables of: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams are measures of teacher quality.
- Another assumption was standardized tests can measure student knowledge about English I. The North Carolina End-of-Course English I exam was used to measure student knowledge about English I.

Limitations

This study was limited in several ways.

- First, the overall sample size of teachers ($n = 45$) and students test scores ($n = 2749$)

was small. The five school districts selected for study have a student population less than 10,000. The majority of these five districts have one large comprehensive high school with approximately nine English teachers.

- Secondly, some demographic variables existed in small sample sizes and some variables were collapsed to accommodate small sample sizes for certain independent variables. For example, teaching experience were collapsed into wider bands of years, if the number teachers in certain bands of years was determined to be less than significant.
- A third limitation was the sample was limited to five low-wealth school districts in North Carolina's Region 4. It is possible these teachers are not representative of the general population of English I teachers.
- A fourth limitation was data from one school year was used to complete the analysis.
- A fifth limitation was available data does not include assessments aligned with the Common Core standards currently used in North Carolina public schools.
- Finally, other variables not examined in this student, such as parental involvement, may influence student performance on standardized tests.

CHAPTER 4: RESULTS

The purpose of this study is to identify teacher characteristics with a positive effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural southeastern North Carolina. The information generated by the analysis may be helpful to school administrators in their evaluation of teacher candidates for English vacancies.

The multiple linear regression approach will be used to address the following research questions:

1. What is the nature of teacher characteristics for English I teachers in North Carolina low-wealth school districts in Region 4?

The second question to be addressed is pending the availability of sufficient data for each of the identified teacher characteristics.

2. What is the effect size of specific teacher characteristics on student achievement on North Carolina End-of-Course English I exams in low-wealth districts?

The third question to be addressed is pending the availability of sufficient data for each of the identified teacher characteristics.

3. What teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams, have the greatest effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth districts and how can these commonalities be used to improve school administrators' ability to identify and recruit highly effective teachers?

Multiple studies have developed effective research models and provided data to analyze how a

variety of teacher characteristics affect student achievement as measured by standardized testing (Boyd et al., 2006; Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008). Teaching experience appears to have a significant correlation to student achievement as measured by standardized testing (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). However, some of the research indicates small or no correlation between teacher characteristics and student achievement as measured by standardized testing (Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009).

Description of the Data Received from NCERDC

Of the 144,728 test scores from the 2011 English I End-of-Course exam received from the North Carolina Education Research Data Center (NCERDC), 3,681 test scores were associated with the five school districts identified for this study: Richmond County Schools, Hoke County Schools, Scotland County Schools, Columbus County Schools, and Whiteville City Schools. Of these test scores, the researcher was able to link 2,749 test scores to forty-five teachers included in the data sets.

Research Questions

1. What is the nature of teacher characteristics for English I teachers in North Carolina low-wealth school districts in Region 4?

SPSS software was used to determine the frequency of explanatory variables, teacher characteristics, associated with the response variable, student test scores. The sample used for this analysis contained 2,749 student test scores. There was no missing data. All student test scores were associated with teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams.

The data indicated a larger percentage of the student test scores were associated with the teacher characteristic, non-National Board Certified teacher, 82% (2,254 out of 2,749). The data indicated 18% (495 out of 2,749) of the student test scores were associated with the teacher characteristic, National Board Certified teacher (see Table 4).

The data indicated a larger percentage of the student test scores were associated with the teacher characteristic, attended an University of North Carolina institution as an undergraduate, 65.3% (1,794 out of 2,749). The data indicated 34.7% (955 out of 2,749) of the student test scores were associated with the teacher characteristic, other sources, such as out-of-state or private, as an undergraduate (see Table 5).

The data indicated 2.8% (78 out of 2,749) of the student test scores were associated with the teacher characteristic, zero years experience. The data indicated 3.3% (90 out of 2,749) of the student test scores were associated with the teacher characteristic, one to two years experience. The data indicated 12.4% (341 out of 2,749) of the student test scores were associated with the teacher characteristic, three to five years experience. The data indicated 20.5% (564 out of 2,749) of the student test scores were associated with the teacher characteristic, six to twelve years experience. The data indicated the highest percentage, 33.1% (909 out of 2,749), of the student test scores were associated with the teacher characteristic, thirteen to twenty years experience. The data indicated 8% (221 out of 2,749) of the student test scores were associated with the teacher characteristic, twenty to twenty-seven years experience. The data indicated 19.9% (546 out of 2,749) of the student test scores were associated with the teacher characteristic, twenty-seven or more years experience (see Table 6).

The data indicated a larger percentage of student test scores were associated with the teacher characteristic, no advanced degree, 82.6% (2,270 out of 2,749). 17.4% (479 out of 2,749)

Table 4

Frequency of Test Scores Associated with Teacher Characteristic, NBCT

NBCT	Frequency	Percent
Yes	495	18%
No	2,254	82%
Total	2,749	100%

Table 5

Frequency of Test Scores Associated with Teacher Characteristic, College Attended

College Attended	Frequency	Percent
UNC	1,794	65.3%
Other	955	34.%
Total	2,749	100%

Table 6

Frequency of Test Scores Associated with Teacher Characteristic, Teaching Experience

Teaching Experience	Frequency	Percent
0 years	78	2.8%
1-2 years	90	3.3%
3-5 years	341	12.4%
6-12 years	564	20.5%
13-20 years	909	33.1%
20-27 years	221	8%
27+ years	546	19.9%
Total	2,749	100%

of the student test scores were associated with the teacher characteristic, advanced degrees (see Table 7).

The data indicated that all of the student test scores were associated with the teacher characteristic, certified, 100% (2,749 out of 2,749).

Teacher licensure exams found in the data set were not used. The data set provided a wide variety of licensure exams and dates of administration. Reliable data to identify the teacher characteristic, licensure exams as above, within, or below the standard deviation was not available.

2. What is the effect size of specific teacher characteristics on student achievement on North Carolina End-of-Course English I exams in low-wealth districts?

Student test scores for the 2011 English I End-of-Course exam from five low-wealth school districts in Region 4 were used in this study. Only student test scores associated with a teacher were used in this study. The sample size was 2,749.

The study analyzed the effect of each teacher characteristic on student test scores. Each student test score was associated with an achievement level, proficiency, and a scale score. First, this study analyzed the relationship between student test scores and teacher characteristics with respect to achievement levels. The possible achievement levels are 1, 2, 3, or 4. Achievement level 4 is the highest possible score. Achievement level 1 is the lowest possible score. Next, this study analyzed the relationship between student test scores and teacher characteristics with respect to proficiency. Achievement levels 3 and 4 indicate proficiency. Achievement levels 1 and 2 indicate non-proficiency. Finally, this study analyzed the relationship between student test scores and teacher characteristics with respect to scale scores. The sample included a range of scale scores from 120 to 175.

Table 7

Frequency of Test Scores Associated with Teacher Characteristic, Advanced Degree

Advanced Degree	Frequency	Percent
Yes	479	17.4%
No	2,270	82.6%
Total	2,749	100%

English I Achievement Levels

The data indicated the largest percentage of student test scores were identified as achievement level 3, 39.5% (1086 out of 2749). The data indicated 29.4% (809 out of 2,749) of the student test scores were identified as achievement level 2. The data indicated 16.8% (463 out of 2,749) of the student test scores were identified as achievement level 1. The data indicated the smallest percentage, 14.2% (391 out of 2,749), of the student test scores were assigned an English I achievement level 4 (see Table 8).

SPSS software was used to conduct Pearson Chi-square tests to determine the significance between the response variable, student test scores as represented by English I achievement levels, and the explanatory variables, teacher characteristics. The data indicated the teacher characteristics, college attended (Pearson Chi-Square Test = 32.227, $df = 3$, $p\text{-value} < .001$) and teaching experience (Pearson Chi-Square Test = 208.977, $df = 18$, $p\text{-value} < .001$) to be significant. The data indicated the teacher characteristics, National Board Certification (Pearson Chi-Square Test = 7.447, $df = 3$, $p\text{-value} = 0.059$) and advanced degree (Pearson Chi-Square Test = 7.543, $df = 3$, $p\text{-value} = 0.056$) were not found to be significant. No statistics were computed for teacher certification because teacher certification is constant (see Table 9).

SPSS Crosstabs were used to determine the frequency of achievement levels for each college attended variable. The data indicated 16.9% (304 out of 1,794) of the student test scores associated with the teacher characteristic, attended UNC schools as an undergraduate, were identified as English I Achievement Level 4. The data indicated 9.1% (87 out of 955) of the student test scores associated with the teacher characteristic, other schools as an undergraduate were identified as English I Achievement Level 4 (see Table 10).

Table 8

Frequency of English I EOC Achievement Levels

English I Achievement Level	Frequency	Percent
1	463	16.8%
2	809	29.4%
3	1,086	39.5%
4	391	14.2%
Total	2,749	100%

Table 9

Pearson Chi-square Test, Achievement Levels

Characteristic	Value	df	Asymp.Sig.
NBCT	7.447	3	.059
College	32.227	3	.000
Teaching Experience	208.977	18	.000
Advanced Degree	7.543	3	.056
Certified	*	*	*

Table 10

Correlation between Achievement Levels and Teacher Characteristic, College Attended

College Attended	1	2	3	4
UNC	15.9% (285/1794)	28.4% (510/1794)	38.7% (695/1794)	16.9% (304/1794)
Other	18.6% (178/955)	31.3% (299/955)	40.9% (391/955)	9.1% (87/955)
Total	16.8% (463/2749)	29.4% (809/2749)	39.5% (1086/2749)	14.2% (391/2749)

The data indicated 30.8% (24 out of 78) of the student test scores associated with the teacher characteristic, zero years experience were identified as English I Achievement Level 4. The data indicated 30% (27 out of 90) of the student test scores associated with the teacher characteristic, one to two years experience were identified as English I Achievement Level 1. The data indicated 1.1% (1 out of 90) of the student test scores associated with the teacher characteristic, one to two years experience were identified as English I Achievement Level 4. The data indicated 46.9% (160 out of 341) of the student test scores associated with the teacher characteristic, three to five years experience were identified as English I Achievement Level 3. The data indicated 7.3% (41 out of 564) of the student test scores associated with the teacher characteristic, six to twelve year experience were identified as English I Achievement Level 4. 19.6% (178 out of 909) of the student test scores associated with the teacher characteristic, thirteen to twenty years experience were identified as English I Achievement Level 4. The data indicated 43.3% (394 out of 909) of the student test scores associated with the teacher characteristic, thirteen to twenty years experience were identified as English I Achievement Level 3. The data indicated 8.7% (79 out of 909) of the student test scores associated with the teacher characteristic, thirteen to twenty years experience were identified as English I Achievement Level 1. The data indicated 4.5% (10 out of 221) of the student test scores associated with the teacher characteristic, twenty to twenty-seven years experience were identified as English Achievement Level 4. The data indicated 25.3% (56 out of 221) of the student test scores associated with the teacher characteristic, twenty to twenty-seven years experience were identified as English Achievement Level 1 (see Table 11).

English I Proficiency

The data indicated 46.3% (1,272 out of 2,749) of the student test scores were identified as

Table 11

Correlation between Achievement Levels and Teacher Characteristic, Teaching Experience

Teaching Experience	1	2	3	4
0 years	14.1% (11/78)	24.4% (19/78)	30.8% (24/78)	30.8% (24/78)
1-2 years	30% (27/90)	36.7% (33/90)	32.2% (29/90)	1.1% (1/90)
3-5 years	12% (41/341)	24% (82/341)	46.9% (160/341)	17% (58/341)
6-12 years	21.6% (122/564)	39.8% (219/564)	32.3% (182/564)	7.3% (41/564)
13-20 years	8.7% (79/909)	28.4% (258/909)	43.3% (394/909)	19.6% (178/909)
20-27 years	25.3% (56/221)	31.7% (70/221)	38.5% (85/221)	4.5% (10/221)
27+ years	23.3% (127/546)	23.4% (128/546)	38.8% (212/546)	14.5% (79/546)
Total	16.8% (463/2749)	29.4% (809/2749)	39.5% (1086/2749)	14.2% (391/2749)

non-proficient, achievement levels 1 or 2. The data indicated 53.7% (1,477 out of 2,749) of the student test scores were identified as proficient, achievement levels 3 or 4 (see Table 12).

Chi-square tests were conducted to determine the significance between the response variable, student test scores as represented by English I proficiency, and the explanatory variables, teacher characteristics. The data indicated the teacher characteristics, National Board Certification (Pearson Chi-Square Test = 6.722, df = 1, p-value = 0.010), college attended (Pearson Chi-Square Test = 7.955, df = 1, p-value = .005) and teaching experience (Pearson Chi-Square Test = 118.153, df = 6, p-value < .001) to be significant. The data indicated the teacher characteristic, advanced degree (Pearson Chi-Square Test = .004, df = 1, p-value = 0.949) was not significant. No statistics were computed for the teacher characteristic, certification because certification is constant (see Table 13).

The data indicated 41% (203 out of 495) of the student test scores associated with the teacher characteristic, National Board Certified teacher were identified as non-proficient. The data indicated 47.4% (1,069 out of 2,254) of the student test scores associated with the teacher characteristic, not National Board Certified teacher were identified as non-proficient.

The data indicated 59% (292 out of 495) of the student test scores associated with the teacher characteristic, National Board Certified teacher, were identified as proficient. The data indicated 52.6% (1,185 out of 2,254) of the student test scores associated with the teacher characteristic, not National Board Certified teacher were identified as proficient (see Table 14).

The data indicated 44.3% (795 out of 1,794) of the student test scores associated with the teacher characteristic, attended UNC as an undergraduate were identified as non-proficient. The data indicated 49.9% (477 out of 955) of the student test scores associated with the teacher characteristic, attended other colleges as an undergraduate were identified as non-proficient.

Table 12

Frequency of English I EOC Proficiency

Proficiency	Frequency	Percent
No Achievement 1 or 2	1,272	46.3%
Yes Achievement 3 or 4	1,477	53.7%
Total	2,749	100%

Table 13

Pearson Chi-Square Test, Proficiency

Characteristic	Value	Df	Asymp.Sig.
NBCT	6.722	1	.010
College	7.955	1	.005
Teaching Experience	118.153	6	.000
Advanced Degree	.004	1	.949
Certified	*	*	*

Table 14

Correlation between Proficiency and Teacher Characteristic, NBCT

NBCT	Non-proficient	Proficient
Yes	41% (203/495)	59% (292/495)
No	47.4% (1069/2254)	52.6% (1185/2254)
Total	46.3% (1272/2749)	53.7% (1477/2749)

The data indicated 55.7% (999 out of 1,794) of the student test scores associated with the teacher characteristic, attended UNC as an undergraduate were identified as proficient. The data indicated 50.1% (478 out of 955) of the student test scores associated with the teacher characteristic, attended other colleges as an undergraduate were identified as proficient (see Table 15).

The data indicated 66.7% (60 out of 90) of the student test scores associated with the teacher characteristic, one to two years experience were identified as non-proficient. The data indicated 60.5% (341 out of 564) of the student test scores associated with the teacher characteristic, six to twelve years experience were identified as non-proficient. The data indicated 57% (126 out of 221) of the student test scores associated with the teacher characteristic, twenty to twenty-seven years experience were identified as non-proficient.

The data indicated 61.5% (48 out of 78) of the student test scores associated with the teacher characteristic, zero years experience were identified as proficient. The data indicated 63.9% (218 out of 341) of the student test scores associated with the teacher characteristic, three to five years experience were identified as proficient. The data indicated 62.9% (572 out of 909) of the student test scores associated with the teacher characteristic, thirteen to twenty years experience were identified as proficient. The data indicated 53.3% (291 out of 546) of the student test scores associated with the teacher characteristic, more than twenty-seven years experience were identified as proficient (see Table 16).

English I Scale Scores

The sample for this study consisted of 2,749 student test scores for the English I End-of-Course exam in low-wealth districts in Region 4. All scores included in this study were valid. The minimum English I scale score in the sample was 120. The maximum English I scale score

Table 15

Correlation between Proficiency and Teacher Characteristic, College Attended

College Attended	Non-proficient	Proficient
UNC	44.3% (795/1794)	55.7% (999/1794)
Other	49.9% (477/955)	50.1% (478/955)
Total	46.3% (1272/2749)	53.7% (1477/2749)

Table 16

Correlation between Proficiency and Teacher Characteristic, Teaching Experience

Teaching Experience	Non-proficient	Proficient
0 years	38.5% (30/78)	61.5% (48/78)
1-2 years	66.7% (60/90)	33.3% (30/90)
3-5 years	36.1% (123/341)	63.9% (218/341)
6-12 years	60.5% (341/564)	39.5% (223/564)
13-20 years	37.1% (337/909)	62.9% (572/909)
20-27 years	57% (126/221)	43% (95/221)
27+ years	46.7% (255/546)	53.3% (291/546)
Total	46.3% (1272/2749)	53.7% (1477/2749)

in the sample was 175. The mean English I scale score in the sample was 146.52 with a standard deviation of 8.947 (see Table 17).

SPSS software was used to conduct one-way ANOVA tests to determine the significance between the response variable, student test scores as represented by English I scale scores, and the explanatory variables, teacher characteristics. The data indicated the teacher characteristics, National Board Certification ($F(1, 2747) = 6.479$, $p\text{-value} = .011$), college attended ($F(1, 2747) = 20.591$, $p\text{-value} < .001$) and teaching experience ($F(6, 2742) = 29.926$, $p\text{-value} < .001$) were found to be significant. The data indicated the teacher characteristic, advanced degree ($F(1, 2747) = 1.477$, $p\text{-value} = .224$) was not found to be significant. No statistics were computed for the teacher characteristic, teacher certification because teacher certification is constant (see Table 18).

The data indicated student test scores associated with the teacher characteristic, National Board Certified teacher had higher mean scores (mean = 147.45, $n = 495$, $sd = 8.883$) than student test scores associated with the teacher characteristic, non-National Board Certified teacher (mean = 146.32, $n = 2254$, $sd = 8.950$) (see Table 19).

The data indicated student test scores associated with the teacher characteristic, attended UNC schools as an undergraduate (mean = 147.09, $n = 1794$, $sd = 9.152$) had higher mean scores than student test scores associated with the teacher characteristic, did not attend UNC schools as an undergraduate (mean = 145.47, $n = 955$, $sd = 8.452$) (see Table 20).

The data indicated student test scores associated with the teacher characteristic, zero years experience (mean = 149.26, $n = 78$, $sd = 10.360$), three to five years experience (mean = 148.33, $n = 341$, $sd = 8.503$), and thirteen to twenty years experience (mean = 148.75, $n = 909$, $sd = 8.389$) had higher mean scores than student test scores associated with the teacher

Table 17

Distribution of English I Scale Scores

	N	Minimum	Maximum	Mean	Std. Deviation
Eng1 Scale	2,749	120	175	146.52	8.947

Table 18

ANOVA, English I Scale Scores

One-way ANOVA	F	Sig.
NBCT	6.479	.011
College Attended	20.591	.000
Teaching Experience	29.926	.000
Advanced Degree	1.477	.224

Table 19

Correlation between Scale Scores and Teacher Characteristic, NBCT

NBCT	N	Mean	Std. Deviation	Std. Error
Yes	495	147.45	8.883	.399
No	2,254	146.32	8.950	.189
Total	2,749	146.52	8.947	.171

Table 20

Correlation between Scale Scores and Teacher Characteristic, College Attended

College	N	Mean	Std. Deviation	Std. Error
UNC	1,794	147.09	9.152	.216
Other	955	145.47	8.452	.274
Total	2,749	146.52	8.947	.171

characteristic, one to two years experience (mean = 141.91, n = 90, sd = 7.120), six to twelve years experience (mean = 144.06, n = 564, sd = 8.360), and twenty to twenty-seven years experience (mean = 143.82, n = 221, sd = 8.151) (see Table 21).

3. What teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams, have the greatest effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth districts and how can these commonalities be used to improve school administrators' ability to identify and recruit highly effective teachers?

SPSS software was used to conduct a multiple linear regression to determine which teacher characteristics had the greatest effect on student achievement.

The data indicates the teacher characteristics, college attended ($B = -3.142$, sig. $< .001$), National Board Certification ($B = -3.073$, sig. $< .001$), and teaching experience ($B = -.567$, sig. $< .001$) to have the greatest effect on student test scores. The data indicates the teacher characteristic, advanced degree ($B = -.241$, sig. = $.599$) does not have a significant effect on student test scores (see Tables 22, 23, 24, and 25).

Summary

The results of the statistical testing led to the conclusion that teacher characteristics, National Board Certification, college attended, and teaching experience, have a significant effect on student test scores. These conclusions support existing research.

The data indicated the teacher characteristic, National Board Certification had a significant effect on student achievement. The data indicated student test scores associated with the teacher characteristic, National Board Certified teacher, had a higher percent of proficient

Table 21

Correlation between Scale Scores and Teacher Characteristic, Teaching Experience

Teaching Experience	N	Mean	Std. Deviation	Std. Error
0 years	78	149.26	10.360	1.1173
1-2 years	90	141.91	7.120	.750
3-5 years	341	148.33	8.503	.460
6-12 years	564	144.06	8.360	.352
13-20 years	909	148.75	8.389	.278
20-27 years	221	143.82	8.151	.548
27+ years	546	145.71	9.696	.415
Total	2,749	146.52	8.947	.171

Table 22

Model Summary, Multiple Linear Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.152	.023	.022	8.850

Table 23

Overall Test Model, Multiple Linear Regression

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5059.433	4	1264.858	16.149	.000
Residual	214916.160	2744	78.322		
Total	219975.593	2748			

Table 24

Multiple Linear Regression

Model	B	Std. Error	Beta	T	Sig.
(Constant)	152.497	.976		156.323	.000
College Attended	-3.142	.431	-.167	-7.287	.000
Advanced Degree	-.241	.459	-.010	-.526	.599
NBCT	-3.073	.509	-.132	-6.036	.000
Teaching Exp.	-.567	.124	-.096	-4.561	.000

Table 25

Lower and Upper Bound, Multiple Linear Regression

Model	Lower Bound	Upper Bound
(Constant)	150.584	154.409
College Attended	-3.987	-2.296
Advanced Degree	-1.142	.659
NBCT	-4.072	-2.075
Teaching Exp.	-.811	-.323

test scores and a higher mean scale score than student test scores associated with the teacher characteristic, non-National Board Certified teacher. Research found National Board Certified teachers, may be more effective than those who are not National Board Certified teachers (Cavalluzzo, 2004; Goldhaber & Anthony, 2005; Vandevoort, Amrein-Beardsley, & Berliner, 2004). The researchers found the evaluation process for National Board Certification reflected practices with a positive effect on student achievement.

The data indicated the teacher characteristic, college attended, had a significant effect on student achievement. The data indicated student test scores associated with the teacher characteristic, attended UNC institution as an undergraduate, had a higher percent of achievement level 4 and proficient test scores, and a higher mean scale score than student test scores associated with the teacher characteristic, attended other institutions as an undergraduate. Researchers found teachers with UNC undergraduate preparation had a slightly better effect on student achievement in high school End-of-Course exams, elementary school mathematics, and elementary school reading compared to teachers from all other sources (Henry, Thompson, Fortner, & et al., 2010). The researchers found UNC undergraduate prepared teachers outperformed out of state undergraduate prepared, visiting international faculty, and lateral entry teachers in several high school subjects. Overall, teachers with UNC undergraduate preparation held a slight advantage over teachers from all other sources in three of the five tested subjects.

The data indicated the teacher characteristic, teaching experience, had a significant effect on student achievement. Research found teaching experience appears to have the most significant correlation to student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). The majority of studies suggest increased teaching experience is associated with increased student achievement in multiple subjects (Clotfelter et al., 2006). As teachers increase their

years of experience, student achievement increases. Some studies attempt to determine the range of experience with the greatest effect on student achievement (Clotfelter et al., 2006). The effects of teaching experience on student achievement appear to plateau between 13 and 26 years. Studies suggest that prior to 13 years of experience the effect appears to increase with experience, after 26 years of experience the effect appears to decrease with experience.

Lack of experience appears to be equally significant in many studies, as inexperienced teachers are found to have a negative effect on student achievement (Clotfelter et al., 2006; Jepsen & Rivkin, 2009). First-year teachers are generally less effective than more experienced teachers, even second-year teachers (Kane et al., 2008; Rivkin et al., 2005; Rockoff, 2004). The attrition of ineffective, first-year teachers may explain the difference in the effect on student achievement of first-year and second-year teachers (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008; Goldhaber, Gross, & Player, 2007; Hanushek et al., 2005; Krieg, 2006). An increase of inexperienced teachers at a school may lead to a decrease in student achievement (Jepsen & Rivkin, 2009). If efforts to staff hard-to-staff schools result in hiring inexperienced teachers, those efforts may have a negative effect on student achievement.

The data indicated the teacher characteristic, advanced degree, did not have a significant effect on student achievement. Research supports this conclusion. Teachers holding advanced degrees were found to have little or no significant effect on student achievement (Clotfelter et al., 2006; Goldhaber & Brewer, 1997; Hanushek, 1996; Kane et al., 2008; Monk, 1994; Wayne & Youngs, 2003). This study found a wide variety of advanced degrees. Several were not related to the English I course content. Additionally, teachers with advanced degrees were small in number.

This study was unable to analyze the effect of teacher certification as all student test

scores were associated with the teacher characteristic, teacher certification. Teachers without certification appear to have a negative effect on student achievement (Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009). Teachers, who are certified, appear to have a significant effect on student achievement, while non-certified teachers appear to have a larger negative effect on student achievement than first-year teachers, but show improvement as they gain experience (Jepsen & Rivkin, 2009). As teachers gain classroom experience, their effect on student achievement appears to improve regardless of certification status.

This study was unable to analyze the effect of licensure exams on student achievement. Some significant issues surrounding licensure exams can explain the disagreements. Research appears to be lacking on the correlation between licensure exams and instructional quality (Hill et al., 2012). The Praxis Series is a common licensure exam, but no available data validates its assessment of a candidate's potential in the classroom (Hill et al., 2012). Licensure cut-scores are typically established with item performance or exam-taker performance in mind, but does not consider actual classroom performance (Hambleton & Pitoniak, 2006; Zieky & Perie, 2006). Additionally, cut-scores vary between states (Hill et al., 2012). Additional concerns about licensure exams compound the differences found in the research.

CHAPTER 5: CONCLUSIONS

The purpose of this study is to identify teacher characteristics with a positive effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth school districts in rural southeastern North Carolina. The information generated by the analysis may be helpful to school administrators in their evaluation of teacher candidates for English vacancies.

The multiple linear regression approach will be used to address the following research questions:

1. What is the nature of teacher characteristics for English I teachers in North Carolina low-wealth school districts in Region 4?

The second question to be addressed is pending the availability of sufficient data for each of the identified teacher characteristics.

2. What is the effect size of specific teacher characteristics on student achievement on North Carolina End-of-Course English I exams in low-wealth districts?

The third question to be addressed is pending the availability of sufficient data for each of the identified teacher characteristics.

3. What teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and (6) licensure exams, have the greatest effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth districts and how can these commonalities be used to improve school administrators' ability to identify and recruit highly effective teachers?

Multiple studies have developed effective research models and provided data to analyze how a

variety of teacher characteristics affect student achievement as measured by standardized testing (Boyd et al., 2006; Clotfelter et al., 2007; Goldhaber, 2007; Harris & Sass, 2007; Kane et al., 2008). Teaching experience appears to have a significant correlation to student achievement as measured by standardized testing (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). However, some of the research indicates small or no correlation between teacher characteristics and student achievement as measured by standardized testing (Borman & Kimball, 2005; Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009).

Description of the Data Received from NCERDC

Of the 144,728 test scores from the 2011 English I End-of-Course exam received from the North Carolina Education Research Data Center, 3,681 test scores were associated with the five school districts identified for this study: Richmond County Schools, Hoke County Schools, Scotland County Schools, Columbus County Schools, and Whiteville City Schools. Of these test scores, the researcher was able to link 2,749 test scores to forty-five teachers included in the data sets.

Research Question #1

What is the nature of teacher characteristics for English I teachers in North Carolina low-wealth school districts in Region 4?

National Board Certification

The data indicated a smaller percentage of the student test scores were associated with the teacher characteristic, National Board Certified teacher, 18% (495 out of 2,749). As research shows, this is consistent with other studies (Goldhaber et al., 2011; Goldhaber, Gross, & Player, 2010; Clotfelter et al., 2006). Even though research shows this is consistent, the percentage of National Board Certified teachers appears to be much lower in other studies (Clotfelter et al.,

2006; Goldhaber et al., 2011; Goldhaber, Gross & Player, 2010). Overall, the majority of teachers included in research are not National Board Certified teachers.

College Attended

The data indicated a larger percentage of the student test scores were associated with the teacher characteristic, attended an University of North Carolina institution as an undergraduate, 65.3% (1,794 out of 2,749). As research shows, this is not consistent with other studies (Henry, Thompson, Fortner, Zulli, & Kershaw, 2010; Henry, Thompson, Bastian, Fortner, Kershaw, Purtell, & Zulli, 2010). Research shows, a larger percentage of teachers in North Carolina attended other institutions as undergraduates (Henry, Thompson, Fortner, Zulli, & Kershaw, 2010; Henry, Thompson, Bastian, Fortner, Kershaw, Purtell, & Zulli, 2010).

Teaching Experience

The data indicated the smallest percentage of the student test scores were associated with the teacher characteristics, zero years experience, 2.8% (78 out of 2,749) and one to two years experience, 3.3% (90 out of 2,749). As research shows, this is consistent with other studies (Clotfelter et al., 2006; Jepsen & Rivkin, 2009). However, other studies found the teacher characteristics, zero years experience and one to two years experience, at higher percentages (Boyd, Lankford, & et al., 2008; Boyd, Lankford, Loeb, Ronfeldt, & Wyckoff, 2010). Overall, there appears to be some variance in research for the teacher characteristics, zero years experience and one to two year experience.

The data indicated the largest percentage of the student test scores were associated with the teacher characteristics, six to twelve years experience, 20.5% (564 out of 2,749) and thirteen to twenty years experience, 33.1% (909 out of 2,749). As research shows, this is consistent with other studies (Clotfelter et al., 2006; Hill, Rowan, & Ball, 2005; Monk, 1994). However, other

studies found the teacher characteristics, six to twelve years experience and thirteen to twenty years experience at lower percentages (Boyd, Lankford, Loeb, Ronfeldt, & Wyckoff, 2010).

The data indicated the percentage of the student test scores associated with the teacher characteristic, twenty-seven years or more experience was 19.9% (546 out of 2,749). As research shows this was not consistent with other studies (Clotfelter et al., 2006). The percentage of student test scores associated with the teacher characteristic, twenty-seven year or more experience was much higher in this study than in other research.

Advanced Degrees

The data indicated a smaller percentage of the student test scores were associated with the teacher characteristic, advanced degree, 17.4% (479 out of 2,749). As research shows, this is consistent with other findings (Buddin & Zamarro, 2009; Clotfelter et al., 2006; Goldhaber et al., 2011; Goldhaber, Gross & Player, 2010; Kane et al., 2008; Xu et al., 2011). However, one study reported nearly half of the teachers in the sample held an advanced degree (Monk, 1994). Overall, the majority of teachers included in research have not earned an advanced degree.

Teacher Certification

The data indicated that all of the student test scores were associated with the teacher characteristic, certified, 100% (2,749 out of 2,749). As research shows, this is not consistent with other findings (Boyd, Lankford, & et al., 2008; Hill, Rowan, & Ball, 2005; Jepsen & Rivkin, 2009; Kane et al, 2008; Monk, 2007). Non-certified teachers are more common in other studies.

Licensure Exams

Teacher licensure exams found in the data set were not used. The data set provided a wide variety of licensure exams and dates of administration. Reliable data to identify the teacher characteristic, licensure exams as above, within, or below the standard deviation was not

available. As research shows, this is not consistent with other studies (Clotfelter et al., 2006; Goldhaber, 2007; Goldhaber et al., 2011). As research shows, the largest percentage of teachers were associated with the teacher characteristic, within one standard deviation of mean on teacher licensure exams (Clotfelter et al., 2006; Goldhaber, 2007; Goldhaber et al., 2011).

As research shows, other studies used a variety of methods to analyze the effect of teacher licensure exams on student achievement (Angrist & Guryon, 2004; Boyd, Lankford, & et al., 2008; Buddin & Zamarro, 2009; Goldhaber et al., 2011; Hill, Umland, Litke, & Kapitula, 2012; Kane et al., 2008; Monk, 2007). Several studies focused on passing rates on teacher licensure exams (Boyd, Lankford, & et al., 2008; Buddin & Zamarro, 2009; Monk, 2007). Other studies focused on SAT scores (Angrist & Guryon, 2004; Kane et al., 2008). Additionally, some studies analyzed either a smaller sample or a cohort sample (Buddin & Zamarro, 2009; Hill, Umland, Litke, & Kapitula, 2012). Due to the variety of statistical analysis utilize in research, a comparison to this study is not reliable.

Research Question #2

What is the effect size of specific teacher characteristics on student achievement on North Carolina End-of-Course English I exams in low-wealth districts?

National Board Certification

The data indicated a larger percentage of the student test scores associated with the teacher characteristic, National Board Certified teacher, were identified as proficient, 59% (292 out of 495) than the teacher characteristic, not National Board Certified teacher, 52.6% (1,185 out of 2,254). Additionally, the data indicated student test scores associated with the teacher characteristic, National Board Certified teacher had higher mean scores (mean = 147.45, n = 495, sd = 8.883) than student test scores associated with the teacher characteristic, non-National

Board Certified teachers (mean = 146.32, n = 2254, sd = 8.950). As research shows, this is consistent with other studies (Cavalluzzo, 2004; Goldhaber & Anthony, 2005; Vandevoot, Amrein-Beardsley, & Berliner, 2004). The National Board Certification process includes a rigorous, standards-based review of a teacher's instructional practices (Darling-Hammond & Rustique-Forrester, 2005). The researchers found the evaluation process for National Board Certification reflected practices with a positive effect on student achievement.

Other studies have found National Board Certified teachers have a greater impact on student achievement in specific categories (Goldhaber & Anthony, 2005; Clotfelter et al., 2006). Teachers who have earned National Board Certification appear to have a greater impact on students from lower-socioeconomic status (Goldhaber & Anthony, 2005). Other studies found a positive impact in reading only (Clotfelter et al., 2006). Overall, the research revealed positive outcomes for student achievement associated with National Board Certified teachers, but the research varies on which students benefit from this teacher characteristic.

College Attended

The data indicated a larger percentage of the student test scores associated with the teacher characteristic, attended UNC schools as an undergraduate, 16.9% (304 out of 1,794), were identified as English I Achievement Level 4 than the teacher characteristic, other schools as an undergraduate, 9.1% (87 out of 955). The data indicated a larger percentage of the student test scores associated with the teacher characteristic, attended UNC as an undergraduate, 55.7% (999 out of 1,794), were identified as proficient than the teacher characteristic, attended other colleges as an undergraduate, 50.1% (478 out of 955). The data indicated student test scores associated with the teacher characteristic, attended UNC schools as an undergraduate (mean = 147.09, n = 1794, sd = 9.152) had higher mean scores than student test scores associated the teacher

characteristic, did not attend UNC schools as an undergraduate (mean = 145.47, n = 955, sd = 8.452). As research indicates, this is consistent with other studies (Henry, Thompson, Fortner, Zulli, & Kershaw, 2010; Henry, Thompson, Bastian, Fortner, Kershaw, Purtell, & Zulli, 2010). The January 2010 study found teachers with UNC undergraduate preparation had a slightly better effect on student achievement in high school End-of-Course exams compared to teachers from all other sources (Henry, Thompson, Fortner, & et al., 2010). Overall, teachers with UNC undergraduate preparation held a slight advantage over teachers from all other sources in three of the five tested subjects.

Additionally, the January 2010 study identified which individual UNC institutions produced teachers with significant impacts in various subjects when compared with teachers from all other sources (Henry, Thompson, Fortner, & et al., 2010). Overall, the authors found the majority of teachers prepared by an UNC institution produced test scores neither better nor worse than teachers from all other sources with some exceptions. The researchers found teachers who attended specific universities had better student achievement in the subject in this study, English I (see Table 26).

The June 2010 study compared UNC undergraduate prepared teachers' effects on test score gains against teachers from other licensure portals: (1) out of state undergraduate prepared, (2) lateral entry, (3) North Carolina private undergraduate prepared, (4) unclassifiable, (5) out of state graduate prepared, (6) UNC graduate prepared, (7) visiting international faculty, (8) UNC licensure only, (9) other licensure only, (10) North Carolina private graduate prepared, and (11) Teach for America (Henry, Thompson, Bastian, & et al., 2010). The researchers found Teach for America and North Carolina private graduate prepared teachers outperformed UNC undergraduate prepared teachers in several high school subjects. The researchers found UNC

Table 26

UNC Institutions with Higher Student Achievement, English I

University	Subjects
North Carolina State University	High school overall
Fayetteville State University	High school English
Western Carolina University	High school English

undergraduate prepared teachers outperformed out of state undergraduate prepared, visiting international faculty, and lateral entry teachers in several high school subjects.

Teaching Experience

The data indicated student test scores associated with the teacher characteristic, zero years experience (mean = 149.26, n = 78, sd = 10.360), three to five years experience (mean = 148.33, n = 341, sd = 8.503), and thirteen to twenty years experience (mean = 148.75, n = 909, sd = 8.389) had higher mean scores than student test scores associated with the teacher characteristic, one to two years experience (mean = 141.91, n = 90, sd = 7.120), six to twelve years experience (mean = 144.06, n = 564, sd = 8.360), and twenty to twenty-seven years experience (mean = 143.82, n = 221, sd = 8.151). As research shows, this is not consistent with other studies (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). The effects of teaching experience on student achievement appear to plateau between 13 and 26 years. Studies suggest that prior to 13 years of experience the effect appears to increase with experience, after 26 years of experience the effect appears to decrease with experience (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006).

The data indicated 61.5% (48 out of 78) of the student test scores associated with the teacher characteristic, zero years experience were identified as proficient. The data indicated 66.7% (60 out of 90) of the student test scores associated with the teacher characteristic, one to two years experience were identified as non-proficient. As research shows, this is not consistent with other studies. Research indicates lack of experience appears to be equally significant in many studies, as inexperienced teachers are found to have a negative effect on student achievement (Clotfelter et al., 2006; Jepsen & Rivkin, 2009). First-year teachers are generally less effective than more experienced teachers, even second-year teachers (Kane et al., 2008;

Rivkin et al., 2005; Rockoff, 2004). The attrition of ineffective, first-year teachers may explain the difference in the effect on student achievement of first-year and second-year teachers (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008; Goldhaber, Gross, & Player, 2007; Hanushek et al., 2005; Krieg, 2006). An increase of inexperienced teachers at a school may lead to a decrease in student achievement (Jepsen & Rivkin, 2009). If efforts to staff hard-to-staff schools result in hiring inexperienced teachers, those efforts may have a negative effect on student achievement.

Advanced Degrees

The data indicated the teacher characteristic, advanced degree, did not have a significant effect on student achievement. Research supports this conclusion. Teachers holding advanced degrees were found to have little or no significant effect on student achievement (Clotfelter et al., 2006; Goldhaber & Brewer, 1997; Hanushek, 1996; Kane et al., 2008; Monk, 1994; Wayne & Youngs, 2003). However, one study found teachers with advanced degrees had a negative effect on student achievement (Clotfelter et al., 2006). Even though advanced degrees usually are associated with an increase in salary, they may not result in the expected increase on student achievement.

Teacher Certification

This study was unable to analyze the effect of teacher certification as all student test scores were associated with the teacher characteristic, teacher certification. As research shows, teachers without certification appear to have a negative effect on student achievement (Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009). Teachers, who are certified, appear to have a significant effect on student achievement, while non-certified teachers appear to have a larger negative effect on student achievement than first-year teachers, but show improvement as they

gain experience (Jepsen & Rivkin, 2009). As teachers gain classroom experience, their effect on student achievement appears to improve regardless of certification status.

Licensure Exams

This study was unable to analyze the effect of licensure exams on student achievement. Some significant issues surrounding licensure exams can explain the disagreements. Research appears to be lacking on the correlation between licensure exams and instructional quality (Hill et al., 2012). The Praxis Series is a common licensure exam, but no available data validates its assessment of a candidate's potential in the classroom (Hill et al., 2012). Licensure cut-scores are typically established with item performance or exam-taker performance in mind, but does not consider actual classroom performance (Hambleton & Pitoniak, 2006; Zieky & Perie, 2006). Additionally, cut-scores vary between states (Hill et al., 2012). Additional concerns about licensure exams compound the differences found in the research.

Some research shows a positive correlation between teachers with licensure exams and student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). Teachers with lower licensure exam scores, or who experience difficulty in passing licensure exams have a negative effect on student achievement in multiple subjects (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). Licensure exams appear to have larger effects on student outcomes in math (Clotfelter et al., 2006). Licensure exams appear to have potential as a predictive indicator of a teacher's future performance (Boyd, Lankford, & et al., 2008).

However, other studies found little or no significant correlation in their analysis of licensure exams' effects on student achievement (Buddin & Zamarro, 2009; Carlisle et al., 2011; Clotfelter, Ladd, Vigdor, & Diaz, 2004; Ferguson, 1991; Goldhaber et al., 2011; Hanushek, 1996; Hill, Umland, Litke, & Kapitula, 2012). Research found some teachers with low licensure

exam scores were associated with positive student achievement, while some teachers with high licensure exam scores were not associated with positive student achievement (Angrist & Guryon, 2004; Goldhaber, 2007). If little or no significant correlation exists, then licensure exams may eliminate potentially successful teachers. This would have a negative impact on the teacher labor market (Angrist & Guryon, 2008; Goldhaber, 2007). Disagreement remains on the significance of the effect of licensure exams on student achievement.

Some studies suggest alternative assessments for determining placement in the classroom (Hill et al., 2012). The Mathematical Knowledge for Teaching (MKT) instrument could be used by school districts to identify desirable candidates for teaching positions in math, as it has positively predicted student outcomes (Hill et al., 2012; Hill, Rowan, & Ball, 2005; Rockoff, Jacob, Kane, & Staiger, 2008). Teachers with strong MKT scores exhibited effective teacher characteristics in their classrooms associated with improved student achievement (Hill et al., 2012). Implementing the MKT would not leave out teachers with the potential to be successful in their classrooms (Hill et al., 2012). However, the MKT is not complete in its exclusion of poor teachers (Hill et al., 2012). Alternative assessments may provide an opportunity to improve teacher selection.

Some studies have analyzed the effect of standardized tests taken by teachers prior to their undergraduate work (Boyd, Lankford, & et al., 2008). The researchers found SAT scores have a positive correlation to student achievement. The researchers found math SAT scores appear to have a positive effect on student achievement. Identifying teachers with math SAT scores one standard deviation above the mean could lead to positive outcomes in student achievement.

Research Question #3

What teacher characteristics, such as: (1) National Board Certification, (2) college attended, (3) teaching experience, (4) advanced degrees, (5) teacher certification, and licensure exams, have the greatest effect on student achievement as measured by North Carolina End-of-Course English I exams in low-wealth districts and how can these commonalities be used to improve school administrators' ability to identify and recruit highly effective teachers?

National Board Certification

The data indicated the teacher characteristic, National Board Certification had a significant effect on student achievement. The data indicated student test scores associated with the teacher characteristic, National Board Certification, had a higher percent of proficient test scores and a higher mean scale score than student test scores associated with the teacher characteristic, non-National Board Certified teacher. Research found National Board Certified teachers, may be more effective than those who are not National Board Certified teachers (Cavalluzzo, 2004; Goldhaber & Anthony, 2005; Vandevort, Amrein-Beardsley, & Berliner, 2004). The researchers found the evaluation process for National Board Certification reflected practices with a positive effect on student achievement.

College Attended

The data indicated the teacher characteristic, college attended, had a significant effect on student achievement. The data indicated student test scores associated with the teacher characteristic, attended UNC institution as an undergraduate, had a higher percent of achievement level 4 and proficient test scores, and a higher mean scale score than student test scores associated with the teacher characteristic, attended other institutions as an undergraduate.

Researchers found teachers with UNC undergraduate preparation had a slightly better effect on student achievement in high school End-of-Course exams, elementary school mathematics, and elementary school reading compared to teachers from all other sources (Henry, Thompson, Fortner, & et al., 2010). The researchers found UNC undergraduate prepared teachers outperformed out of state undergraduate prepared, visiting international faculty, and lateral entry teachers in several high school subjects. Overall, teachers with UNC undergraduate preparation held a slight advantage over teachers from all other sources in three of the five tested subjects.

Teaching Experience

The data indicated the teacher characteristic, teaching experience, had a significant effect on student achievement. Research found teaching experience appears to have the most significant correlation to student achievement (Boyd, Lankford, & et al., 2008; Clotfelter et al., 2006). The majority of studies suggest increased teaching experience is associated with increased student achievement in multiple subjects (Clotfelter et al., 2006). As teachers increase their years of experience, student achievement increases. Some studies attempt to determine the range of experience with the greatest effect on student achievement (Clotfelter et al., 2006). The effects of teaching experience on student achievement appear to plateau between 13 and 26 years. Studies suggest that prior to 13 years of experience the effect appears to increase with experience, after 26 years of experience the effect appears to decrease with experience.

Lack of experience appears to be equally significant in many studies, as inexperienced teachers are found to have a negative effect on student achievement (Clotfelter et al., 2006; Jepsen & Rivkin, 2009). First-year teachers are generally less effective than more experienced teachers, even second-year teachers (Kane et al., 2008; Rivkin et al., 2005; Rockoff, 2004). The attrition of ineffective, first-year teachers may explain the difference in the effect on student

achievement of first-year and second-year teachers (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2008; Goldhaber, Gross, & Player, 2007; Hanushek et al., 2005; Krieg, 2006). An increase of inexperienced teachers at a school may lead to a decrease in student achievement (Jepsen & Rivkin, 2009). If efforts to staff hard-to-staff schools result in hiring inexperienced teachers, those efforts may have a negative effect on student achievement.

Advanced Degree

The data indicated the teacher characteristic, advanced degree, did not have a significant effect on student achievement. Research supports this conclusion. Teachers holding advanced degrees were found to have little or no significant effect on student achievement (Clotfelter et al., 2006; Goldhaber & Brewer, 1997; Hanushek, 1996; Kane et al., 2008; Monk, 1994; Wayne & Youngs, 2003).

Teacher Certification

This study was unable to analyze the effect of teacher certification as all student test scores were associated with the teacher characteristic, teacher certification. Teachers without certification appear to have a negative effect on student achievement (Boyd, Lankford, & et al., 2008; Jepsen & Rivkin, 2009). Teachers, who are certified, appear to have a significant effect on student achievement, while non-certified teachers appear to have a larger negative effect on student achievement than first-year teachers, but show improvement as they gain experience (Jepsen & Rivkin, 2009). As teachers gain classroom experience, their effect on student achievement appears to improve regardless of certification status.

Licensure Exams

This study was unable to analyze the effect of licensure exams on student achievement. Some significant issues surrounding licensure exams can explain the disagreements. Research

appears to be lacking on the correlation between licensure exams and instructional quality (Hill et al., 2012). The Praxis Series is a common licensure exam, but no available data validates its assessment of a candidate's potential in the classroom (Hill et al., 2012). Licensure cut-scores are typically established with item performance or exam-taker performance in mind, but does not consider actual classroom performance (Hambleton & Pitoniak, 2006; Zieky & Perie, 2006). Additionally, cut-scores vary between states (Hill et al., 2012). Additional concerns about licensure exams compound the differences found in the research.

Conclusions

National Board Certification

The teacher characteristic, National Board Certification, was found to have a positive effect on student achievement in both this study and the literature. The National Board Certification process guides teachers in developing reflective practices. These reflective practices may be the reason for the increased student achievement associated with the teacher characteristic, National Board Certification. The districts included in this study would benefit from identifying candidates who have National Board Certification, or willing to complete the process.

College Attended

The teacher characteristic, attended UNC institution as an undergraduate, was found to have a positive effect on student achievement in both this study and the literature. The University of North Carolina institutions are better connected with the public schools of North Carolina than other institutions. Many of the other institutions found in this study were out-of-state institutions. UNC institutions are more likely to utilize the North Carolina Standard Course of Study in their

teacher preparation programs. Also, the UNC institutions are more familiar with the expectations of North Carolina teachers.

Teaching Experience

The teacher characteristic, zero years experience, was found to have a positive effect on student achievement in this study, but not in the literature. In most studies, teachers with no experience have a negative effect on student achievement. The inconsistency in this study may be attributed to teacher-student matching. Another qualified teacher with experience may have not been available, so the school administrator may have assigned high-performing students to inexperienced teachers. Also, only two teachers in this study had zero years experience. The sample size is too small to recommend hiring more teachers with zero years experience. However, the effect of the teacher characteristic, one to two years experience, is consistent in both this study and the literature. It may benefit student achievement to hire teachers with no experience rather than teachers with some experience. School administrators may find it easier to mold a new teacher rather than a teacher with pre-existing habits and dispositions.

The teacher characteristic, thirteen to twenty years experience, was found to have a positive effect on student achievement in both this study and the literature. This range of experience appears to be the most beneficial to student achievement. School administrators appear to be aware of this as more student test scores were associated with this teacher characteristic.

The teacher characteristic, twenty-seven years or more, was found to be associated with a decline in student achievement. The high percentage of test scores in this study associated with this teacher characteristic was surprising. Additionally, teaching experience varied from twenty-eight to forty-two years. In forty-two years, many changes have occurred. New standards, state

assessments, and methods have been introduced and replaced over this time. It could be reasonably assumed that a teacher with more than twenty-seven years experience has had a successful career. The decline in student achievement may be the result of continuing to employ instructional practices that were successful under previous standards and assessments, but not as closely aligned with current standards and assessments.

Advanced Degrees

The teacher characteristics, advanced degrees, was not found to have a significant effect on student achievement in both this study and the literature. The study did not find consistency in the advanced degrees held by teachers. Many teachers in the study held advanced degrees in content areas not related to English I. Also, the majority of the degrees were from out-of-state institutions. These factors may be the reason for the absence of significance. Advanced degrees are commonly compared with National Board Certification. The difference in significance appears to be in the practices taught by each. It could be argued that the National Board Certification process does a better job preparing teachers than an advanced degree.

Teacher Certification

The teacher characteristic, certified, was constant in this study. The literature found teacher certification to have a positive effect on student achievement. Certified teachers have completed training to prepare them to meet classroom expectations. They have been exposed to effective instructional practices. Additionally, by completing the certification process, they have made a commitment to the teaching profession. These factors may explain the positive effect on student achievement found in the literature. The fact that all of the teachers included in this study were certified is promising. It appears that school administrators in these districts have made a

commitment to hiring certified teachers and assigning them tested courses. Based on the literature, this approach should have a positive effect on student achievement.

Licensure Exams

The researcher was unable to establish a reliable method to analyze the effect of the teacher characteristic, licensure exams. Additionally, the literature appears to be inconclusive. A minimum licensure exam score is required to earn certification. Teacher candidates may be focused on achieving the minimum required instead of the highest possible score. College entrance exam scores may prove to be more reliable as the candidate is attempting to score the highest possible score. However, relying on an exam score taken when the candidate is still enrolled in high school may cause some concern to school administrators.

Implications

After reviewing the research, several steps are recommended to ensure hiring practices are in alignment with the findings. Policies may not be the best way to ensure hiring success. Instead a number of steps have been recommended that may strengthen the process:

- Conduct a study of district hiring practices. Establish new minimum requirements for teacher candidates based on the criteria found to be most reliable in predicting teacher success. Based on this study, school administrators reviewing applications for English teacher positions should identify candidates with National Board Certification, an undergraduate degree from a UNC institution, and thirteen to twenty years experience.
- Provide professional development for administrators on best practices for hiring new staff. Move from a ‘trust your gut’ method to a more scientific method. Utilizing findings from this study and the literature, school districts should develop

professional development to improve the hiring practices of their school administrators.

- School districts would be wise to prioritize the National Board Certification process for their staff, not only for recruitment, but retention, as well. School districts should consider funding the cost for the application for their teachers. Increasing the number of National Board Certified teachers appears to be an effective method to improve student achievement.
- Evaluate current application forms for appropriate content. Rewrite applications to align with current expectations. The application should prioritize the teacher characteristics found to have a positive effect on student achievement. Based on this study, National Board Certification status, college attended, and teaching experience should be placed near the beginning of the application to assist school administrators.
- Create a central clearing house for teacher applications. Teacher candidates would be eliminated who do not meet the minimum requirements. Teams of school administrators could work to evaluate applications based on a set of standardized requirements. This would provide a cache of desirable candidates, while building the capacity of school administrators to identify effective candidates.
- Collaborate with university partners to develop candidates with desired qualities. Identify potential candidates earlier in their development. The study indicates partnerships with University of North Carolina institutions may improve student achievement. The school districts in this study would benefit from partnerships with the UNC institutions in their area, UNC Pembroke and Fayetteville State University.

The hiring of quality teachers is too important to be left to ‘trusting one’s gut.’ As Mason

and Schroeder (2010) suggest school administrators must reduce the uncertainty of hiring teachers to ensure their schools' success.

Practical Applications

- School administrators are recommended to spend time each day preparing for future vacancies. This may include evaluating staff for potential vacancies, reviewing applications, and networking with teachers, district administrators, and university professors.
- School administrators with a contingency plan for replacing staff members are better prepared to fill vacancies. This requires school administrators to know their current staff. Effective school administrators know which teachers may leave due to low performance, promotion, retirement, or personal reasons. A school administrator who begins the replacement process early is better prepared to hire an effective new teacher.
- Applications are available to school administrators through a variety of sources. School administrators should review current applications often, especially for areas of highest need. School administrators should identify teacher characteristics associated with positive student achievement. Desirable applications should be further investigated. A school administrator may want to schedule a phone interview with the candidate or call references to learn more about the applicant for potential vacancies. This process could be completed at a district level to create a clearing house of desirable candidates.
- Networking with teachers, district administrators, and university professors may lead to potential candidates for vacancies. Building relationships with teachers outside of a

school administrator's staff may lead to knowledge of teachers interested in transferring or of effective student teachers in other schools. District administrators, especially in the human resources department, may have knowledge of potential candidates for vacancies. Sharing potential vacancies with district administrators may give the school administrator an advantage in hiring an effective teacher. University professors are familiar with their upcoming graduates. Developing relationships with university professors may lead to hosting student teachers, which provides an opportunity to evaluate a potential candidate. Also, professors can provide information about recent graduates who are looking for teaching positions.

- Once a school administrator has been notified of a vacancy, the process to hire an effective teacher should begin immediately. If a list of desirable candidates has been previously developed, the school administrator should schedule interviews with their top candidates. If not, a list of desirable candidates should be developed immediately. Interview teams provide a better perspective on how a potential candidate might work with the current staff. Interview teams should include representatives of the staff most likely to interact with the new hire. Interview questions should be consistent and focused on instructional and relationship skills. Members of the interview team should be allowed to ask clarifying questions, but not add questions not asked of all potential candidates.
- After conducting initial interviews, school administrators may want to add a practical application exercise. This could include asking the candidate to teach a lesson to a group of students or simulating a parent-teacher conference. These exercises provide the interview team insight to how the candidate may respond to daily expectations of

teachers. A rubric for evaluating these exercises is recommended. Additionally, part of these exercises should include providing feedback to the candidate. This will allow the interview team to evaluate how well the candidate receives feedback for improvement.

- Once a candidate has been selected for the position, a school administrator may want to make the call with the interview team on speaker phone. This creates a family atmosphere and may convince the candidate they want to be a part of the staff. Also, it sends the message the candidate will be supported in the transition of joining the staff.

Recommendations

- This study was limited by the selection of five low-wealth school districts in Region 4 and the selection of the 2011 English I End-of-Course exam. Expanding the study to include additional low-wealth school districts is recommended. Other low-wealth school districts in North Carolina have similar challenges when hiring teachers. Identification of teacher characteristics with positive effects on student achievement in low-wealth school districts may provide an opportunity to improve the quality of education provided in these school districts.
- Expanding the study to include other subjects is recommended. This would provide a wider view of the effect of teacher characteristics on student achievement. The effectiveness of teacher characteristics may vary from subject to subject and grade to grade. Expanding the study to include a span of years may strengthen the study. A study including school years over a three or five year period may provide previously unavailable data. In 2013, North Carolina administered End-of-Course exams aligned

with the Common Core standards. At the time of this study, data was unavailable for the Common Core exams. A study including data from the Common Core exams could provide a valuable comparison. Expanding the study to include additional school districts, subjects, and years could provide school administrators with a template for desirable teacher characteristics for all possible vacancies.

- A study comparing the hiring practices in education and other industries is recommended. Analyzing the characteristics desired in candidates for employment in other industries may provide additional guidance for school administrators. Many industries have accepted hiring policies and practices that are beneficial. Identifying the most effective policies and practice in other industries and adapting them to education may prove to improve student achievement.
- Expanding the study to include licensure exams is recommended. This study was unable to determine the effect of the teacher characteristic, licensure exams, on student achievement. All teachers in this study were certified, therefore all teachers had licensure exams. The data set included licensure exams over a period of time of nearly forty years and twenty different exams. The researcher was unable to identify if the standard deviation for this variety of years and exams. Also, a single teacher may have taken several licensure exams. A teacher may have licensure exams both above, within, and below standard deviation. A study of a cohort of teachers with the same licensure exams is recommended. This would generate a consistent data set to study. The study of licensure exams effect on student achievement may provide additional guidance for school administrators with regards to hiring teachers.

- A teacher characteristic not included in this study was a teacher's undergraduate grade point average. Expanding the study to include a teacher's undergraduate grade point average is recommended. A teacher's undergraduate grade point average was not included in the data set used for this study. It is included on the North Carolina application for teacher vacancies and is a part of a teacher's transcript, which must be submitted prior to hiring. A teacher's undergraduate grade point average may be associated with desirable teacher characteristics, such as determination, ability to plan work and meet deadlines, communication skills, and success when working in teams. The study of a teacher's undergraduate grade point average effect on student achievement may provide additional guidance for school administrators with regards to hiring teachers.
- Another recommendation for study would be to evaluate the effect of combined teacher characteristics on student achievement. This study evaluated the effect of single teacher characteristics on student achievement. Future studies could combine teacher characteristics to provide a more comprehensive evaluation of teacher characteristics. For example, teacher characteristics, National Board Certified teacher, attended an UNC institution as an undergraduate, and six to thirteen years experience may have a greater combined effect on student achievement than a single teacher characteristic. School administrators review teacher applications as a whole, not as single characteristics. A study of the effect of combined teacher characteristics on student achievement may provide a more comprehensive guide for school administrators with regards to hiring teachers.

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APPENDIX A: DATA SETS

The data utilized in this study were obtained from the North Carolina Education Research

Data Center. The data sets used are listed below.

- 2011 End-of-Course Results English I
- 2011 School Activity Report/Meeting Codes
- 2011 School Activity Report/Personnel Files
- 2011 School Activity Report/Student Count
- 2011 Teacher/Education
- 2011 Teacher/Licensure
- 2011 Teacher/National Board Certification
- 2011 Teacher/Pay
- 2011 Teacher/Testing
- 2011 Teacher/WCS

APPENDIX B: INSTITUTIONAL REVIEW BOARD APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office 252-744-2914 · Fax 252-744-2284 · www.ecu.edu/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB

To: Jonathan McRae

CC: Bill Grobe

Date: 5/12/2014

UMCIRB 14-000699

Re: Advancing the Science of Hiring Teachers: An Analysis of the Effects of Teacher Characteristics on Student Achievement

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 5/12/2014 to 5/11/2015. The research study is eligible for review under expedited category #5. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Advancing the Science of Hiring Teachers	Study Protocol or Grant Application

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418

Study.PI Name:

Study.Co-Investigators: