

**THE EFFECT OF NATIONAL BOARD CERTIFIED TEACHERS ON AVERAGE STUDENT
ACHIEVEMENT IN NORTH CAROLINA SCHOOLS**

By

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Executive Summary

North Carolina is home to the largest concentration of National Board Certified Teachers (NBCTs) in the country. This is in part due to the generous incentive program offered to those successful in gaining National Board Certification. In 2005, the state invested over \$40 million in salary supplements for North Carolina NBCTs. This study seeks to determine if NBCTs presence in schools has a direct effect on student performance and/or an indirect effect on student performance mediated by working conditions of teacher empowerment, leadership and professional development. The statistical analysis reveals when student demographic variables are controlled, schools with a larger proportion of NBCTs demonstrate moderately higher test scores. Additionally, a larger proportion of NBCTs coincides with a small increase in teacher empowerment, but these gains are unrelated to the improvement in student test scores. The results indicate North Carolina is receiving benefits from investing in National Board Certification.

Introduction and Background

In 1983, the United States Commission on Excellence in Education released the historic report, *A Nation at Risk*. The report warned the United States risked falling behind the rest of the world in economic competitiveness due to lagging student achievement (US Department of Education, 1983). In response to this looming crisis, the Carnegie Forum on Education and the Economy published *A Nation Prepared: Teachers for the 21st Century*, with an ambitious plan to ensure that a highly qualified teacher occupies every classroom (Carnegie Forum on Education and the Economy, 1986). The commission's emphasis on teacher quality was justified, as the quality of the teacher is consistently found to be an important predictor of student achievement (Goldhaber, 2002; Ferguson, 1998; Haycock, 1998). *A Nation Prepared* recommended the creation of the National Board for Professional Teaching Standards (NBPTS, 1989) to establish high and rigorous standards for what teachers should know and be able to do and to certify teachers who meet those standards.

NBPTS identifies quality teaching through an extensive review of teacher portfolios and assessment centers. Teachers' assessments are judged against five core propositions NBPTS believes represent what a teacher should know and be able to do. (See **APPENDIX 1**, for the five propositions). Teachers often spend over a year developing video portfolios and evidence of teaching improvement in preparation for certification. The process is rigorous, as indicated by the 48 percent passage rate for those attempting certification (Goldhaber & Anthony, 2004). Teachers who pass the board's standards are referred to as National Board Certified Teachers (NBCTs).

Since the first class of NBCTs in 1994, states have offered incentives to encourage teachers to become board certified. Over 500 local school districts and all 50 states offer incentives or recognition of National Board Certification. No state has been more successful in promoting National Board Certification than North Carolina. In 2005, North Carolina had the largest population of NBCTs, with 9,814 certified teachers, representing over 20 percent of all NBCTs. North Carolina's success in encouraging National Board Certification can be attributed in part to former Governor Jim Hunt's support of the program, both as the founding Board Chair of the NBPTS and as the major proponent of North Carolina's generous incentive program. Inducements include a 12 percent salary bonus for the ten-year life of the National Board Certification, reimbursement of the \$2300 certification fee, and paid time off to prepare certification portfolios. This program represents an increasing educational investment by the state, as the salary supplement alone cost the state over \$40 million in 2005, up from \$30 million in 2004.

The large expense of NBCT incentives has increased pressure to show student achievement results from National Board certification. Critics of the program have suggested there is no established link between NBCTs and enhancements to student achievement (Podgursky, 2001). Others have suggested a market-based approach to rewarding teachers is a better use of educational resources (Stone, 2002). In response, this study serves to investigate the effectiveness of the state's NBCT incentive program, by measuring its impact on raising student achievement.

Review of Literature

The research on the effects of NBCTs on student achievement is limited due to the small population of NBCTs until recent years. Early scholarship on NBCTs focused on the question of whether the certification process correctly identifies highly skilled teachers. In a case study of teachers preparing for the board certification assessment, Van Driel, Beijaard, & Verloop (2001) found the assessment more accurately determined the candidates' ability to articulate the NBPTS values rather than to demonstrate them, indicating the assessment system could result in false positive results. Similarly, others argue the certification assessment is not sufficient to identify quality teachers, as it only provides a snapshot of the candidate's skills (Schutz & Moss, 2004). Further research into the effects of NBCTs on student achievement may help determine if the NBPTS is identifying quality teaching.

Small scale studies of NBCTs have found little difference between certified and non-certified teachers in relation to student achievement (Stephens, 2003; Stone, 2002). However, the statistical power

of these studies was hampered by the small number of teachers in each study. Additionally, the Stone study relied heavily on the Tennessee value-added system as a measure of teacher effectiveness. Under this approach, teachers would be rewarded solely based on measurable advances in achievement rather than on adherence to professional standards of teaching skills and knowledge. Use of this system has been seriously questioned as a means of determining teacher effectiveness (Kupermintz, 2003).

Some studies have found positive effects on student achievement by NBCTs. In a NBPTS funded study, Bond, Smith, Baker, & Hattie (2000) compared teachers who were successful in obtaining National Board Certification to those who attempted the process and failed. The researchers developed 13 measures of prototypic features of expert teachers through a meta-analysis of current research. The authors found NBCTs excelled in all 13 measures, and there was a statistically significant difference between successful candidates and those who had failed the assessment in 11 of the measures. The researchers also found students of successful candidates produced written assessments demonstrating higher understanding through more relational and abstract work.

Two recent longitudinal studies suggest NBCTs' students outperform students of non-certified teachers. In a study of NBCTs in Arizona, Vandevort and colleagues (2004) found NBCTs surpass their non-certified colleagues in student achievement in 75 percent of cases. The study found the added benefit of NBCT instruction was equal to approximately one extra month of instruction over the course of a school year. The first large longitudinal study of NBCTs was conducted in North Carolina over the course of three years with 200,000 students in grades 3-5 (Goldhaber & Anthony, 2004). The authors found NBCTs outperformed both non-NBCTs and teachers who had unsuccessfully attempted certification. However, the test score increases for students of NBCTs were modest.

This study seeks to build on this research and investigate the ways in which NBCTs affect student performance. To fully understand the effect of NBCTs on school-wide performance, potential mediating factors such as teacher working conditions must be examined. Positive teacher working conditions have been found to be precursors to successful school reform in low-performing schools (Taylor & Bogotch, 1993). Additionally, working conditions that support a school-wide professional community among teachers increase the likelihood of school reforms designed to improve student achievement (Louis, Marks, & Kruse, 1994). The Southeast Center for Teacher Working Conditions found a direct correlation between teacher-reported working conditions and student achievement in an analysis of data from the 2004 North Carolina Governor's Teacher Working Conditions Survey (Hirsch, 2004). The report found teacher perceptions of school leadership, professional development, teacher empowerment, and school facilities were associated with improved student achievement on North Carolina ABCs (the state's accountability program) assessments. This study seeks to determine if the presence of NBCTs in schools has a direct effect on student performance and/or an indirect effect on student performance mediated by working conditions of teacher empowerment, leadership and professional development.

NBCTs may play a unique role in their schools that impact school-wide teacher working conditions. Evidence of NBCTs' active influence on their schools in Whitman's (2002) research found NBCTs were less likely than non-certified teachers to believe that student outcomes are dependent on external conditions. Often NBCTs take on leadership roles focused on improving student achievement in their schools after obtaining National Board Certification (Sato, Hyler, & Monte-Sano, 2002; Ralph, 2003). A survey of NBCTs found 99 percent of them were participating in leadership roles aimed at improving teacher quality or student achievement (NBPTS, 2001). Finally, three separate North Carolina studies found NBCTs seek and obtain leadership roles and are more likely to engage in professional development activities (Petty, 2002; O'Connor, 2003; Dagenhart, 2003). This is not entirely surprising, as one of the original goals in the NBPTS founding documents is to engage NBCTs in school transformation and reform through teacher leadership (NBPTS, 1989).

Purpose of the Study

The purpose of this research is two-fold. First, this paper seeks to determine the relationship between the prevalence of NBCTs in North Carolina schools and school-wide student achievement, as defined by the state's ABCs assessments. Second, the paper will investigate the effect of NBCTs on the

mediating variable of teacher working conditions, indicated by teacher responses to the 2004 North Carolina Teacher Working Conditions Survey. The results of this research will aid state policy makers in determining if the state's investment in NBCT incentives is producing gains in school-wide student achievement. Additionally, this research will determine if NBCTs effects on school-wide student achievement are partly explained by their effect on teacher working conditions. The results may shed light on methods to better use NBCTs for school improvement.

Methodology

The methodology for this study consists of testing a multi-variate regression model. This was done using a three-step process. First, ABCs composite test scores for the 2003-2004 school year were obtained from all North Carolina public schools from the North Carolina Department of Public Instruction (DPI) to serve as a measure of student achievement and the dependent variable. Variables for student racial composition, socioeconomic status, and teacher experience, provided by DPI, were added to the model to account for other factors commonly associated with student outcomes. The ratios of NBCTs in the teacher workforce for each school were calculated from the 2002-2003 school year rosters. Because teacher rosters are calculated in March of 2003, the 2002-2003 NBCT ratios were used to account for a full year of instruction before the March 2004 ABC assessments. A linear regression was computed to estimate the percentage of variance in student achievement explained by student racial composition, socioeconomic status, teacher experience, and NBCT status.

Second, North Carolina schools were divided into quartiles (none, low, medium, high) based on the percentage of NBCTs in the school faculty. A univariate analysis of variance test (ANOVA) was run to determine if there is a statistically significant difference in the mean student performance scores between these groups. This test will help determine if there is a threshold percentage of NBCTs needed to have a statistically significant impact on student achievement.

Third, to test the effect of NBCTs on teacher working conditions, this study used three of the five indices of teacher working conditions created by the Southeast Center for Teaching Quality (Hirsch, 2004): teacher empowerment, leadership, and professional development. Three linear regressions were computed to test if the effect of the ratio of NBCTs was statistically significant in explaining the variance in the indices of teacher empowerment, leadership, and professional development.

Findings

The results of the linear regression in step one show that the ratio of NBCTs in North Carolina classrooms is significantly ($p < .05$) predictive of student performance (See **Figure 1**, for full results); however, the effect is modest. Given these results, an increase in the ratio of NBCTs of 10 percent in a school would result in an ABC score increase of nearly one point on a hundred point scale. While these results appear insignificant, they must be viewed in the proper context. These findings are consistent with those found by Goldhaber & Anthony (2004), who found the increases in student achievement in NBCT classrooms to be relatively small. In contrast, this study examined the effects of NBCTs on the entire school. The results indicate NBCTs have a positive school-wide effect over and above student racial composition, and socioeconomic status.

Not surprisingly, the effect of the racial composition of the schools, particularly the percent of African American students, explained the largest portion of variance in student achievement. This is consistent with a large body of literature indicating that race and socioeconomic status are the strongest predictors of student achievement (Sutton & Soderstrom, 2001). Additionally, the percentage of African American and Native American students in the school population was negatively correlated with school-wide achievement. Contrary to expectations, the percent of students eligible for free and reduced lunch was not statistically significant in the model. Some research suggests that the effects of race and socioeconomic factors are highly correlated and when used together in a statistical model, the effect of socioeconomic factors mitigates the effect of race. Surprisingly, the opposite was found in this model, and this result should be viewed with caution.

The relative strength of different teacher qualification variables in the model suggests that National Board Certification has a greater effect on student achievement than other measures of teacher excellence. The percentage of teachers with advanced degrees did not contribute significantly to the variance in student test scores, suggesting that National Board Certification is a better indicator of teaching success than attaining a masters or doctorate degree. The percentage of teachers with a lateral entry license was negatively correlated with student achievement and contributed significantly to the variance in school-wide achievement. This result suggests the use of lateral entry teachers in North Carolina schools may be counteracting the positive effects of school improvement policies.

The results of the ANOVA analysis in part two suggest school wide performance continues to rise as more NBCTs are added to the school workforce (see **Figure 2** for full results). The analyses show there is not a statistically significant difference in the student performance of schools without NBCTs and the low group. In contrast there is a significant difference between the performance of those schools without NBCTs and the medium and high groups. This suggests that schools will have to achieve a teaching staff composed of 3.6 percent to 7.4 percent of NBCTs to see a statistically significant improvement in student performance. Additionally, there is a statistically significant difference between the student achievement in the medium and high groups, confirming student performance gains continue to rise as additional NBCTs are added to staff.

With respect to teacher working conditions, the ratio of NBCTs explained a statistically significant portion of the variance in teacher-reported working conditions for the index of teacher empowerment ($p < .05$). The ratio of NBCTs was not significant in explaining the indices of professional development and leadership (see **Figure 3** for full results). This result suggests that teachers may have less direct control of professional development and leadership opportunities within a school than opportunities for empowerment. The power of the NBCT effect on empowerment is small and should be viewed in the context of school-wide effects on teacher working conditions. Additionally, the positive effect of NBCTs on teacher empowerment may explain a small part of the positive effect on student achievement.

Limitations of the Study

The results of this study should be interpreted with caution due to the greater than average distribution of NBCTs in high performing schools and the tendency to assign higher performing students to more effective teachers (Goldhaber, Choi, & Kramer, 2004). However, in a study of North Carolina NBCTs, Goldhaber & Anthony (2004) found the distribution of NBCTs and high performing students to be unrelated to the student achievement gains of NBCTs' students found in the study.

The conclusions of this study must be tempered by the questionable validity of using standardized tests as the sole criterion of teacher performance. This is a particularly relevant critique when evaluating NBCTs as there is evidence NBCTs are less likely to base lesson plans on improving testing performance and more likely to view standardized testing as a negative influence on student learning (Rapp, 2001).

Public Policy Implications

Cost Effectiveness

The results of this study are consistent with the literature, which suggests students of NBCTs outperform students of non-certified teachers. This study found a small school-wide difference in student test scores in North Carolina schools with larger proportions of NBCTs. This suggests that the state is receiving a positive benefit from its investment in the current NBCT incentive program. This study does not offer an opinion concerning the cost effectiveness of the program; however, as the monetary investment in the program continues to grow with each additional teacher obtaining National Board Certification there will be increasing pressure to show a positive return on investment. A study by Goldhaber and Anthony (2004) estimated that the monetary incentives are more expensive than proven student achievement reforms, such as reducing class size. It should be noted this study was exploratory and this area deserves additional research. Policy makers should not make cost comparisons without

taking into account the additional benefits of the NBCT incentive program, such as improvement in teacher working conditions and teacher retention.

Effects on Teacher Working Conditions

Recent scholarship in the area of teacher working conditions and the results of this study suggest that NBCTs effect on teacher working conditions deserves additional study. This study found the effect of NBCTs to be so small as to be inconsequential. This finding is surprising in light of research indicating NBCTs increased participation in leadership and professional development activities (Sato, et. al. 2002; Ralph, 2003; NBPTS, 2001; Petty, 2002; O'Connor, 2003; Dagenhart, 2003). The cause of this contradiction could simply be the concentration of NBCTs is currently too small to detect a relationship with teacher working conditions or NBCTs' skills could be underutilized within schools. A quote from the NBPTS president suggests this issue is already a concern for the National Board: "The challenge now is to further integrate them into decision making process, ensuring that their growing leadership capabilities do not go untapped" (NBPTS, 2001).

To fully gauge the effect of NBCTs on student performance future research must investigate the interaction between NBCTs with other teachers and administration in addition to the direct effect on student achievement. A better qualitative understanding of how NBCTs are utilized in schools could pave the way for school administrator trainings focusing on how to help administrators use the skills and knowledge of NBCTs to better realize potential gains in teacher working conditions and student achievement (Berry & Ferriter, 2006).

Increasing the Concentration of NBCTs in North Carolina Schools

This study has demonstrated increasing the concentration of NBCTs is likely to positively affect student performance. For this reason, state policy makers may want to consider requiring newly national board certified teachers to mentor other teachers seeking certification in their schools, or low-performing schools, for five years to be eligible for the 12 percent salary bonus. This would serve the dual purpose of insuring NBCT involvement with other teachers and encourage the increase in the percentage of NBCTs in schools. Currently no commitments are required of NBCTs to receive the bonus, yet there is evidence NBCTs are already regularly mentoring inexperienced teachers (National Governors Association, 2003). This new mentoring requirement could be particularly helpful increasing the number of NBCTs in hard-to-staff schools with fewer resources to aid certification candidates.

Recruitment of NBCTs to Low-Performing Schools

Goldhaber and colleagues (2004) found NBCTs are less likely to teach in districts with high poverty and minority rates. This suggests the NBCT incentive dollars are unequally distributed to affluent school districts. North Carolina policy makers may consider restructuring the NBCT incentive program to address equity concerns by encouraging NBCTs to work in low performing schools. Four states offer added enhancements to NBCTs who teach in hard to staff schools. Changes to the Georgia Master Teachers Program recently revised the NBCT incentive program to offer bonuses only to those teachers willing to make a commitment to teach in struggling schools for a five-year period (2005). Due to the increasing cost of NBCT incentives in North Carolina and the student achievement disparity between high poverty and low poverty schools, policy makers will face increasing pressure to direct incentive dollars to low-performing schools. However, North Carolina should not abandon the current incentive program without first studying the effects of the new incentive programs in other states. To do so without understanding the effects on NBCT certification rates could risk slowing the student achievement gains observed in this study.

Conclusions

This study examined the relationship between NBCTs and school-wide impacts on student achievement and teacher working conditions. The results suggest the state is receiving a positive return on its investment in subsidizing National Board Certification. However, lawmakers may consider changes to

the program to fully realize the potential of NBCTs and spread the benefits of the program more equitably across the state. Perhaps with focused improvements, the North Carolina NBCT incentive program could become a school improvement program in addition to rewarding highly qualified teachers.

APPENDIX A:

National Board of Professional Teaching Standards Five Core Propositions of What Teachers Should Know and Do

1. Teachers are committed to students and their learning. Accomplished teachers are dedicated to making knowledge accessible to all students. They act on the belief that all students can learn. They treat students equitably, recognizing the individual differences that distinguish one student from another and taking account of these differences in their practice. They adjust their practice based on observation and knowledge of their students' interests, abilities, skills, knowledge, family circumstances, and peer relationships.

Accomplished teachers understand how students develop and learn. They incorporate the prevailing theories of cognition and intelligence in their practice. They are aware of the influence of context and culture on behavior. They develop students' cognitive capacity and their respect for learning. Equally important, they foster students' self-esteem, motivation, character, civic responsibility, and their respect for individual, cultural, religious and racial differences.

2. Teachers know the subjects they teach and how to teach those subjects to students. Accomplished teachers have a rich understanding of the subject(s) they teach and appreciate how knowledge in their subject is created, organized, linked to other disciplines and applied to real-world settings. While faithfully representing the collective wisdom of our culture and upholding the value of disciplinary knowledge, they also develop the critical and analytical capacities of their students.

Accomplished teachers command specialized knowledge of how to convey and reveal subject matter to students. They are aware of the preconceptions and background knowledge that students typically bring to each subject and of strategies and instructional materials that can be of assistance. They understand where difficulties are likely to arise and modify their practice accordingly. Their instructional repertoire allows them to create multiple paths to the subjects they teach, and they are adept at teaching students how to pose and solve their own problems.

3. Teachers are responsible for managing and monitoring student learning. Accomplished teachers create, enrich, maintain, and alter instructional settings to capture and sustain the interest of their students and to make the most effective use of time. They also are adept at engaging students and adults to assist their teaching and at enlisting their colleagues' knowledge and expertise to complement their own. Accomplished teachers command a range of generic instructional techniques, know when each is appropriate, and can implement them as needed. They are as aware of ineffectual or damaging practice as they are devoted to elegant practice.

They know how to engage groups of students to ensure a disciplined learning environment, and how to organize instruction to allow the schools' goals for students to be met. They are adept at setting norms for social interaction among students and between students and teachers. They understand how to motivate students to learn and how to maintain their interest even in the face of temporary failure. Accomplished teachers can assess the progress of individual students as well as that of the class as a whole. They employ multiple methods for measuring student growth and understanding and can clearly explain student performance to parents.

4. Teachers think systematically about their practice and learn from experience. Accomplished teachers are models of educated persons, exemplifying the virtues they seek to inspire in students -- curiosity, tolerance, honesty, fairness, respect for diversity and appreciation of cultural differences -- and the capacities that are prerequisites for intellectual growth: the ability to reason and take multiple

perspectives to be creative and take risks, and to adopt an experimental and problem-solving orientation. Accomplished teachers draw on their knowledge of human development, subject matter and instruction, and their understanding of their students to make principled judgments about sound practice. Their decisions are not only grounded in the literature, but also in their experience. They engage in lifelong learning that they seek to encourage in their students. Striving to strengthen their teaching, accomplished teachers critically examine their practice, seek to expand their repertoire, deepen their knowledge, sharpen their judgment and adapt their teaching to new findings, ideas and theories.

5. Teachers are members of learning communities. Accomplished teachers contribute to the effectiveness of the school by working collaboratively with other professionals on instructional policy, curriculum development, and staff development. They can evaluate school progress and the allocation of school resources in light of their understanding of state and local educational objectives. They are knowledgeable about specialized school and community resources that can be engaged for their students' benefit, and are skilled at employing such resources as needed. Accomplished teachers find ways to work collaboratively and creatively with parents, engaging them productively in the work of the school.

FIGURE 1: Regression Results

Student Performance

Independent Variables	Unstandardized Coefficients
NBCT 2002-2003	0.094**
Free and Reduced Lunch	-0.008**
Native American	-0.074***
Asian	0.215***
Hispanic	-0.053*
Black	-0.167***
Lateral Entry	-0.499***
Advanced Degree	-0.022

Adjusted R Square = .363

F = 164.4***

p≤.10*, p≤.05**, p≤.01***

FIGURE 2: ANOVA Results

Description of School Groups

Groups	Percentage of NBCTs	Student Performance Mean	N
None	0	80.78	592
Low	.01-3.6	82.34	438
Medium	3.61-7.4	84.29	517
High	7.4-40	86.35	516

Multiple Comparisons

Comparison of Groups	Difference in Means
None	Low -1.559
	Medium -3.510***
	High -5.572***
Low	None 1.559
	Medium -1.951**
	High -4.013***
Medium	None 3.510***
	Low 1.951**
	High -2.062**
High	None 5.572***
	Low 4.013***

Medium	2.062**
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F = 23.082***

p≤.10*, p≤.05**, p≤.01***

FIGURE 3 – Teacher Working Conditions Regression Results

Empowerment Index

Independent Variables	Unstandardized Coefficients
NBCT 2002-2003	0.006**
Free and Reduced Lunch	0.001***
Native American	0.001
Asian	-0.012***
Hispanic	-0.005***
Black	-0.003***
Lateral Entry	-0.014***
Advanced Degree	0.002*

Adjusted R Square = .080

F = 21.855***

p≤.10*, p≤.05**, p≤.01***

Leadership Index

Independent Variables	Unstandardized Coefficients
NBCT 2002-2003	0.001
Free and Reduced Lunch	0.001***
Native American	0.001
Asian	-0.012***
Hispanic	-0.003*
Black	-0.003***
Lateral Entry	-0.012***
Advanced Degree	0.001

Adjusted R Square = .056

F = 15.235***

p≤.10*, p≤.05**, p≤.01***

Professional Development Index

Independent Variables	Unstandardized Coefficients
NBCT 2002-2003	0.001
Free and Reduced Lunch	0.001***
Native American	0.004***
Asian	-0.010***
Hispanic	0.001
Black	-0.001**
Lateral Entry	-0.012***
Advanced Degree	0.000

Adjusted R Square = .055

F = 14.977***

p≤.10*, p≤.05**, p≤.01***

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