The Distribution of National Board Certified Teachers in Virginia

Laura D. Kassner

Dissertation submitted to the faculty of the
Virginia Polytechnic Institute and State University in partial fulfillment of the
requirements for the degree of

Doctor of Education
In
Educational Leadership and Policy Studies

Carol S. Cash, Chair
Glen I. Earthman
N. Wayne Tripp
Travis W. Twiford

March 26, 2012
Blacksburg, Virginia

Keywords: teacher quality, National Board Certified Teachers, National Board for Professional Teaching Standards, human resource distribution, equity, incentives, race/ethnicity, socioeconomic status, ability to pay

The Distribution of National Board Certified Teachers in Virginia

Laura D. Kassner

ABSTRACT

This study provides a descriptive analysis of the distribution of National Board Certified Teachers (NBCTs) in Virginia, which offers financial compensation to these educators regardless of teaching assignment. Most localities provide additional incentives to recruit and retain NBCTs, again, not targeted or structured in any way. Given the impact of high quality teachers on student learning and the well-documented disparities in access for subsets of the student population, it is important to obtain a baseline measure of NBCT distribution in Virginia upon which leaders might build a plan for reform. Three research questions were addressed: How are NBCTs distributed across Virginia with regards to divisions' ability to pay? In school divisions with a high concentration of NBCTs, what incentive structures do these divisions offer to either support teachers while they apply to NBPTS or to recruit and retain previously successful NBCTs? What are the characteristics of the schools in which NBCTs serve with regards to the race/ethnicity and socioeconomic status of their student populations? The researcher determined NBCTs were distributed unequally across Virginia's divisions and schools based on divisions' ability to pay and student demographics. Formal support structures were found in most high concentration divisions.

Dedication

To my True Companion, Bernie, for your encouragement and support. May we grow old, make fun, and love each other a long time – forever.

To my dear son, Hudson Michael, for the endless joy and deep sense of purpose you've brought to my world. May you feel this same joy and purpose in your endeavors in life, may we, as your parents always support those dreams, and may our next tuition bill be yours.

To Dr. Linda A. Underwood, my mentor and dear friend. Thank you for seeing talents in me worth developing. You've impacted my life immensely and I'm so thankful.

To Dr. Bill Hansen, one of my beloved sociology professors who told me he wished I'd do more to change the world than "just teach." While I assert teaching matters a great deal, may this dissertation marry my love for education and sociology and be the beginning of more work for equity and justice across disciplines.

Acknowledgements

Many thanks to the following: My wise, patient, and always helpful Chair, Dr. Carol Cash, and other esteemed members of my committee, Dr. Wayne Tripp, Dr. Travis Twiford, and Dr. Glen Earthman. Dr. Kerry Alday, who blazed a trail and was willing to share. My cheerleading squad at work, Linda Underwood, Diane Bennett, Connie Foreman, Demetra Harris, Tom DeWeerd, Pete Gretz, Steve Geyer, Jen Waggener, and Tina McCay. My cheerleading squad at home, Bernie and Hudson. My sister and father, my in-laws, my cohort family, my Bstud girls, a myriad of encouraging friends, and my son's wonderful babysitters. Many high quality educators who've invested in me over the years including Janet Lipsky, Carol Tenebruso, Kay Askew, Stephanie Estes, and Dr. Debra Schleef. Great thinkers regarding school and societal reform, Jonathan Kozol and Pedro Noguera. Collaborators Chongrui Yu and Xinran Hu at Virginia Tech's Laboratory for Interdisciplinary Statistics Analysis. Brian Mason, Patty Pitts, Dr. Mark Allan, Alice Bryant, Eleanor Joyce, and Dara Tucker from the Virginia Department of Education. NBPTS Regional Outreach Directors Karen Garr, Kay Garcia, and Wilbur Parker. Patty Dimetres, NBCT program coordinator in Fairfax County. Panera and the Goochland Public Library, my two best work spots. The music of Iron & Wine, Ray LaMontagne, Bebo Norman, Adele, Buena Vista Social Club, Caedmon's Call, Courtyard Hounds, Dave Matthews, David Gray, John Mayer, Mat Kearney, Needtobreathe, Nickel Creek, Sara Bareilles, Thievery Corporation, William Fitzsimmons, and Darius Rucker.

Table of Contents

List of Figures

List of Tables

Chapter 1 – Introduction

Statement of the Problem

The reauthorization of the Elementary and Secondary Education Act (ESEA) as No Child Left Behind (NCLB) in 2001 placed heavy emphasis on the examination of student achievement data in demanding accountability for results (U.S. Department of Education, 2003). This standards-based framework attempted to ensure a quality education for all students by tying accreditation and funding to student performance on high-stakes assessments. The benchmarks, set by individual states, would become the measuring stick for all students: White and minority, regular and exceptional learner, native English speakers and speakers of other languages, students from both poor and affluent communities (U.S. Department of Education, 2003). Additionally, the legislation established the term "highly qualified teacher" and charged the states with determining the appropriate professional qualifications for educators. Setting high expectations, using data to inform instructional decisions, and examining gaps among subgroups of students have increased awareness of inequities in public education over the last decade (Noguera, 2008). Among other goals, NCLB dictated that states identify and address the inequitable distribution of highly qualified teachers to "ensure that poor and minority children are not taught at higher rates than other children by inexperienced, unqualified, or out-of-field teachers" (No Child Left Behind, Title I, Part A, Section 111 [b][8][C]).

The increased awareness of inequities has led to wider acknowledgement of achievement gaps (Center on Education Policy, 2007; Noguera, 2008), between White and non-White, between poor and non-poor, between regular education students and

students with disabilities, and between native English speakers and speakers of other languages. Achievement gaps exist in other subgroups (e.g., gender and disability) and in other measures (i.e., discipline and graduation rates), but for the purpose of this study, the focus will be placed on concepts of school community demography, specifically students' race/ethnicity and socioeconomic status, and the discrepancies in access to high quality teachers.

Research shows that teaching matters (Darling-Hammond & Sykes, 2004; Learning Point, 2007; Parker, 2008). Good instruction as well as negative school experiences directly impact student performance. The residual impact of an ineffective teacher remains in evidence for years in student achievement measures, while an effective teacher can yield significant gains in the course of a school year (Sanders & Rivers, 1996). Therefore, if educational leaders want to ensure equal opportunities for all American children, they must consistently provide students with access to high quality teachers (Goe, Parker, Carr, & Oxnam, 2009).

Educators generally hold the National Board Certification process in high-regard (Kelley & Kimball, 2001; Goldhaber, Choi, & Cramer, 2004). Along with numerous other states, the Commonwealth of Virginia considers attainment of the National Board for Professional Teaching Standards (NBPTS) credential as a pathway to achieving highly qualified status (Virginia Department of Education, 2006) under ESEA. While this is not the only measure of teacher quality, some researchers assert it is one reasonable approximation (Bond, Smith, Baker, & Hattie, 2000; Cavalluzzo, 2004; Goldhaber & Hansen, 2009; Goldhaber, Perry, & Anthony, 2004; Kelley & Kimball, 2001).

From its inception through 2003, the federal government, states, localities, and foundations have spent more than $200 million to develop and implement the NBPTS program (Humphrey, Koppich, & Hough, 2004), and the Progressive Policy Institute estimates that states spend over $100 million annually on incentives for National Board Certified Teachers (NBCTs) (Rotherham, 2004). These figures do not include the cost of optional local incentives. Given the magnitude of the cost and the disparities in NBCT compensation, research into the effects of these incentives and the impact on students should be explored (Goldhaber, Choi, & Cramer, 2004).

In her dissertation, Alday (2011) recommended areas for further research that included state and division-level inquiry. She called for a study of the distribution of NBCTs in Virginia school divisions and specific investigations into the effectiveness of additional stipends on the likelihood of NBCTs working in high need schools. This study will describe the distribution of National Board Certified Teachers in and among Virginia public school and school divisions.

Overview of the Study

This study examines and describes the distribution of National Board Certified Teachers in Virginia. By examining the teaching assignments of NBCTs, division-level data on incentive structures, and the demographic characteristics of school communities, the impact of local incentive structures on NBCT can be assessed relative to populations of minority and impoverished students. The concentration of NBCTs will also be correlated to a school division's Local Composite Index value, a measure of a division's ability to pay, with the intention of describing the characteristics of schools and communities that attract NBCTs.

Statement of Purpose

The purpose of this study is to provide a baseline description of the distribution of National Board Certified Teachers in the Commonwealth of Virginia, the incentive structures of the school divisions in which they work, and the characteristics of the student populations in the schools in which NBCTs serve, specifically race/ethnicity and socioeconomic status. The researcher wishes to offer this baseline information to the Commonwealth as a springboard for possible reform efforts.

Significance and Justification of the Study

In 2010, the United States Department of Education solicited grant applications from states for the purpose of encouraging innovation and progress in a number of core areas. This program, known as Race To The Top (RTTT), specifically encouraged efforts to work towards the "equitable distribution of effective teachers and principals" (U.S. Department of Education, 2010, pp.14-15), implying the relevance of such reform efforts.

The stark contrast in educational opportunities among students, schools and divisions is well-documented (Berry & Darling-Hammond, 2006; Darling-Hammond, 2007; Noguera, 2003, 2008; Rotherham, 2004; Tennessee Department of Education, 2007). The predictability of success and failure by race/ethnicity and income points to serious warning signs for the future, especially given that minority and poor populations are increasing much more rapidly than White and non-poor populations (Institute for Research on Poverty, 2004).

In a book detailing the success of Montgomery County Public Schools at tackling inequities within the Maryland school system, Superintendent Jerry Weast

communicated a “twin imperative” (p.26) to his constituents by emphasizing the moral and economic aspects of the problem. Weast described investing in high-need communities was not only the right thing to do morally, but the smart thing to do for the economic health of the entire region (Childress, Doyle, & Thomas, 2009). This twin imperative is relevant on a local, state and national scale.

To the degree that the NBPTS credential may impact a teacher’s career opportunities and mobility, the career choices of NBCTs may impact, positively or negatively, the distribution of NBCTs teachers working in schools with high minority and high poverty student populations. If the credential increases teachers’ marketability and eligibility for stipends and salary supplements, NBCTs may opt to move to more affluent divisions offering better job characteristics and compensation (Goldhaber, Choi, & Cramer, 2004). Should the credential increase NBCTs’ desire to work with minorities and impoverished students, investing their sharpened skillset with students who need them most, NBCTs may opt to stay in or move to a more challenging work setting.

Collecting and analyzing data regarding the distribution of NBCTs in the Commonwealth of Virginia could serve as a baseline from which to work at targeting initiatives to improve equity in the future. If National Board Certification makes a teacher more valuable and marketable, the distribution of this human resource should be examined (Goldhaber, Choi, & Cramer, 2004; Humphrey, Koppich, & Hough, 2005). Goe, Parker, Carr, and Oxnam (2009) assert, “states must be able to identify the conditions that have contributed to their challenges in order to effectively respond to them” (p.74) and call for baseline data to be collected on the current distribution of teachers in order to determine the effectiveness of strategies, policies and incentives.

By uncovering the distribution of NBCTs, incentive structures and policies can be crafted to target the recruitment and retention of high-quality teachers by federal, state, and local educational leaders as well as legislators and professional organizations.

Research Questions

Three broad research questions will guide this study: How are NBCTs distributed across the Commonwealth of Virginia with regards to divisions' ability to pay? In school divisions with a high concentration of NBCTs, what incentive structures do these divisions offer to either support teachers while they apply to NBPTS or to recruit and retain previously successful NBCTs? What are the characteristics of the schools in which NBCTs serve with regards to the race/ethnicity and socioeconomic status of their student populations?

Theoretical and Conceptual Framework

Researchers have documented significant differences in measures of teacher quality between schools and districts (Berry & Darling-Hammond, 2006; Center for Teaching Quality, 2007; Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Perry, & Anthony, 2004; Goldhaber, Choi, & Cramer, 2004; Humphrey, Koppich, & Hough, 2005; Koppich, Humphrey, & Hough, 2007; Lankford, Loeb, & Wyckoff, 2002; Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007) which stem, at least in part, from personal decisions by educators on where to work. Significant personal factors include value placed on proximity to home (Boyd, Lankford, Loeb, & Wyckoff, 2005), compensation packages and non-pecuniary job characteristics (Berry & Darling-Hammond, 2006; Darling-Hammond & Sykes, 2004; Goldhaber, Choi, & Cramer, 2004; Parker, 2008).

More challenging teaching environments, offering minimally sufficient compensation and characterized by low-achievement among high proportions of poor and/or minority students, are significantly disadvantaged in the recruitment of high quality teacher talent (Darling-Hammond & Sykes, 2004). The challenge of retention further complicates the challenges of recruiting, as the lack of teacher longevity at disadvantaged schools is well-documented (Darling-Hammond & Sykes, 2004; Koppich, Humphrey, & Hough, 2007; Parker, 2008). Teachers in more challenging schools and divisions tend to move more frequently in common and predictable ways, attempting to transfer up to more desirable schools or districts or suffering burnout and leaving the profession altogether (Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber & Hansen, 2009; Goldhaber, Perry, & Anthony, 2004; Koppich, Humphrey, & Hough, 2007).

Most candidates apply to schools and divisions characterized by strong non-pecuniary job characteristics and competitive compensation (Darling-Hammond & Sykes, 2004) as well as consistently high-achievement and a fairly homogenous population of non-minority students from non-poor communities (Goldhaber, Choi, & Cramer, 2004; Goldhaber & Hansen, 2009). These organizations typically boast of strong teacher retention rates, so the strongest candidates in those environments typically stay (Goe, Parker, Carr, & Oxnam, 2009).

Darling-Hammond & Sykes (2004) affirm an adequate supply of teacher candidates nationwide, but point to a “mismatch” (p.166) of qualified applicants with vacancies in challenging schools and districts resulting from factors such as

> disparities in pay and working conditions, interstate barriers to teachers' mobility, inadequate recruitment incentives, bureaucratic hiring systems that discourage qualified applicants, transfer policies that can slow hiring and allocate staff inequitably, and financial incentives to hire cheaper, less qualified teachers (p.166).

Darling-Hammond and Sykes (2004) argue these factors create

> a legally sanctioned, two-tiered staffing systems [in which] schools that cannot afford competitive salaries, cannot provide attractive working conditions, and educate the most needy students will be staffed with emergency hires and recruits from untested alternatives, while advantaged schools will continue to recruit teachers with more complete professional education (p.169).

Given the blanket incentive offered by the Commonwealth of Virginia and the potential for additional incentives offered by localities, the researcher anticipated the distribution of NBCTs across the state would relate strongly to certain school and division factors, including student body demographics, a division's ability to pay, and the presence or absence of additional local financial incentives.

Definition of Terms

District/division. School organizations Virginia are referred to as divisions rather than school districts. However, elsewhere in the country, the term school district is more commonly used. The researcher will use the term "division" to refer to a school-related organization in the Commonwealth of Virginia while using the term "district" for school-related organizations outside of Virginia. Essentially these two terms are used interchangeably with sensitivity to accuracy.

Impoverished students or students of low socioeconomic status. Defined as students eligible for receiving free or reduced price meals, this is a commonly used estimate of poverty or low socioeconomic status (SES) in schools. The National School Lunch Program and School Breakfast Program are the federally assisted meal programs supervised by the United States Department of Agriculture that use income eligibility guidelines to determine recipients of free or reduced-priced breakfast and lunch. Recipients of free meals come from households with income at or below 130% of the federal income poverty guidelines, and recipients of reduced price meals come from households with income at or below 185% of federal income poverty guidelines (USDA, 2011).

Local Composite Index (LCI). The Composite Index measures a school division's ability to pay education costs fundamental to the Commonwealth's Standards of Quality (SOQ). It is calculated using three indicators of a locality's ability to pay:

- True value of real property (weighted 50%)
- Adjusted gross income (weighted 40%)
- Taxable retail sales (weighted 10%)

Each locality's index is adjusted to maintain an overall statewide local share of 45% and an overall state share of 55% (VDOE, 2011). The maximum value for the LCI is 0.8, which means that the locality, because of its high ability to pay, is responsible for funding 80% of the costs mandated by the Standards of Quality with the state contributing the remaining 20%. Conversely an LCI value of 0.2 means the locality pays 20% and the state pays 80%.

National Board Certified Teacher (NBCT or NBCTs plural**).** A teacher who has attained National Board Certification (NBC) from the National Board for Professional Teaching Standards (Alday, 2011; National Board for Professional Teaching Standards Advocacy Link, 2008) in any certification area recognized by the organization. A NBCT may also be referred to as a "successful applicant," since credential from NBPTS has been successfully achieved.

National Board for Professional Teaching Standards (NBPTS). NBPTS is an independent, nonprofit organization that was founded to advance the quality of teaching and learning (Alday, 2011; National Board for Professional Teaching Standards Advocacy Link, 2008).

Race/ethnicity. Definitions of race/ethnicity will be kept consistent with state and Minimum Federal Reporting Categories. These seven categories are Hispanic/of any race, American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian/Pacific Islander, White, and Two or more races (VDOE, 2011b; National Forum on Education Statistics, 2008). The researcher calculated percentages of Non-White students at the school and division levels, collapsing all Non-White racial groups into one, including students who identify themselves as being of more-than-one race.

Limitations

The following conditions were beyond the control of the researcher and must be acknowledged: Most of the data utilized in the analyses were generated, reported, and collected by individuals, organizations, and agencies other than the researcher. State reports are generally considered reliable and authoritative, but the potential for human error and/or skewed reporting by divisions should be acknowledged.

The measure used to approximate the socioeconomic status of students is free and reduced lunch counts, which may not accurately reflect true financial need of families. As a general trend, more families of elementary-aged students apply for assistance, and this number tapers off as students get older and perhaps feel a stigma about paying less or nothing at all in the lunch lines (Burghardt, Gordon, Chapman, Gleason, & Fraker, 1993).

Finally, quantitative methodology allows the uncovering of trends, but not necessarily a deep understanding of the situational motivations for each career move. Behind every number is a person with a story, and while this methodology falls short of capturing individual stories, it may pave the way for future research.

Delimitations

The researcher purposely and intentionally controlled the following aspects of the study: First, the population for the study included all NBCTs in the Commonwealth of Virginia, so as a result, the transferability of findings are limited beyond the state. The rationale for choosing Virginia is addressed in Chapter 3.

Instead of considering multiple definitions and approximations for highly qualified teachers, such as an advanced degree in the content taught by the teacher, only National Board Certification was considered. The NBPTS credentialing process is highly regarded, rigorous and standardized, whereas in the example of graduate education, regard and rigor depend upon variables such as the field of study, the institution offering the course, and the professor delivering instruction.

A division's ability to pay is measured by the local composite index (LCI), the calculation utilized by the Virginia General Assembly to determine the ratio of state and

local funding responsibility. As with all other funding formulas, LCI is an imperfect measure of ability to pay, but the use of LCI by the Commonwealth of Virginia legitimized this methodological choice.

Organization of the study

Chapter 2 summarizes and synthesizes research literature that addresses the broad research questions posed in Chapter 1. In Chapter 3, the research methodology is described at length before results are presented in Chapter 4. Finally, Chapter 5 summarizes and highlights key findings, implications, and opportunities for future research.

Chapter 2 – Literature Review

Search details

To gather peer-reviewed scholarly literature, the researcher accessed the Education Research Complete and ERIC databases from EBSCOhost through Virginia Tech's online library resources. First, to examine the career paths of National Board Certified Teachers after earning the credential, the search terms "National Board Certification" and "teacher" were utilized, yielding 332 results. The search was further limited to peer-reviewed articles published from 2000 to 2010. The revised search resulted in 68 items, the first of which was a strong match. The 2009 study by Goldhaber and Hansen matched the initial topic of interest, examining the career paths of National Board Certified Teachers. After reading the article, the concept of inequities emerged, so the bibliography was used to identify subsequent articles. To achieve saturation, other searches were conducted in the database using various combinations of the following search terms: "teacher quality," "National Board for Professional Teaching Standards," "National Board Certified Teacher," "equity," "recruitment," "retention," "student achievement," and "achievement gap."

De Facto Segregation

While American schools racially integrated decades ago following the Brown v. Board of Education decision, students still attend schools that often reflect the homogenous composition of their neighborhoods (Parker, 2008). Through geographic definitions of boundaries and definitions of places of residence, underserved populations of students are deprived of access to good schools (Parker, 2008; Weinberg, 1967). Cash-strapped, overcrowded and overburdened school systems are

ill-equipped to compete with affluent communities when trying to recruit and retain high quality teacher candidates (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond & Sykes, 2004), thereby impacting the quality of instruction students receive. Funding differences impact these recruiting and retention forces directly in the form of teacher salaries, benefits, signing bonuses, professional development opportunities such as tuition reimbursement and professional conferences, and the availability of instructional resources. As a result, when considered corporately, these disadvantages translate into unequal access to resources for students living in underserved communities (Parker, 2008).

Characteristics of Schools and Districts where Teachers Desire to Work

Teachers tend to sort into predictable work environments. Studies indicate a strong responsiveness of teachers in the labor market to salary and the role of non-pecuniary job characteristics including class size, planning time, the quality of facilities, the availability of instructional resources, and student body demographics in employment decisions (Lankford, Loeb, & Wyckoff, 2002). Parker (2008) detailed critical factors in teacher employment decision-making such as the presence of friends or mentors, perceptions of school leadership, and a school's curricular or pedagogical approach. Higher salaries, competitive benefits packages, positive work environments and signing bonuses aid well-to-do school districts in the recruitment of standout teacher applicants (Balter & Duncombe, 2008; Bracey & Molnar, 2003; Lankford, Loeb, & Wykoff, 2002). Disadvantaged schools typically pay teachers less despite more challenging workloads and work environments; thus, recruiting skilled teachers proves a challenge in light of the "double disadvantage" (p.206) of their context (Darling-

Hammond & Sykes, 2004). Darling-Hammond & Sykes (2004) also add the importance of organized, efficient human resources departments and district personnel policies that aid in fast hiring of top talent.

Additionally, the geographic pull of home impacts decision-making with regards to accepting a teaching position. Boyd, Lankford, Loeb, and Wyckoff (2005) point out that very often teachers choose to work in close proximity to their hometowns, or at least in communities that resemble the demographic and geographic features of their homes. This preference for home further hinders recruiting efforts, since location and demographics are characteristics school districts cannot change. Since urban schools are net-importers of teachers (Boyd, Lankford, Loeb, & Wyckoff, 2005), these recruiting obstacles must be overcome to fulfill the staffing needs of disadvantaged schools.

Should these schools manage to attract strong teachers despite recruiting obstacles, attrition rates are high (Berry & Rasberry, 2007; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009). Strong teachers are more likely to make moves out of disadvantaged schools to either situations with higher pay and more positive non-pecuniary work characteristics or to leave the profession altogether (Cavalluzzo, 2004; Goldhaber & Hansen, 2009).

Quality of Teachers in Underserved Areas

Lankford, Loeb, and Wyckoff (2002) assigned composite scores of teacher quality to educators across the state of New York, and the data revealed an inequitable distribution of high-quality teachers. In the case of New York City, the inequities were dramatically highlighted where approximately 10% of the schools had an average teacher quality lagging five standard deviations lower than the state mean. The

variation in teacher quality across schools did not appear to be a recent phenomenon, as the researchers observed inequities over the past fifteen years across a majority of the measures. The researchers examined the behaviors of a cohort of new teachers entering the New York public schools from 1993 through 1998. Fewer than 40% still taught in their original school after five years. Most of the teachers who exited the system left teaching in New York public schools altogether, and when the characteristics of those who exited were examined, it was discovered that those who transferred to a different district or quit teaching had stronger teacher quality measures than those who stayed. Teachers with low composite scores of quality were more likely to stay in disadvantaged schools (Lankford, Loeb, & Wyckoff, 2002), further perpetuating the gap in the quality of the educational experience of students in disadvantaged schools.

Darling-Hammond & Sykes (2004) asserted that teacher supply is not the root cause of the teacher quality problem, as the number of new teachers produced annually on the national level exceeds demand, but rather the distribution of resources is to blame. It is well known that skilled teachers are not evenly distributed throughout schools; and this variation in teacher quality often falls along lines of race/ethnicity and poverty (Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber & Hansen, 2009; Koppich, Humphrey, & Hough, 2007; Parker, 2008). Generally speaking, less-qualified teachers work with poor, non-White, Limited English Proficient students in urban and rural areas (Darling-Hammond, L., 1997; Darling-Hammond & Sykes, 2004; Rotherham, 2004). Students facing the most difficult challenges are being taught by the least qualified teachers, and

as a result, the system perpetuates inequities or perhaps makes these inequities worse (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Humphrey, Koppich, & Hough, 2005; Lankford, Loeb, & Wyckoff, 2002; Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007).

An inequitable distribution of high-quality teachers in American public schools exists due to a confluence of factors. These factors that lead to a shortage of high quality teachers in low-performing schools include

> substandard working conditions, a paucity of incentives for high-quality teachers to choose difficult teaching environments, longstanding policies and practices related to teacher transfer and assignment, and the culture of teaching itself that awards greater professional standing to teachers in higher- rather than lower-performing schools. (Koppich, Humphrey, & Hough, 2007, p.9)

To address the issue of equity, one cannot neglect to address significant labor market obstacles (Darling-Hammond & Sykes, 2004) related to the issue of teacher sorting (Parker, 2008). According to Goldhaber, Choi, & Cramer (2004),

> in the absence of compensating salary differentials, it appears that more credentialed, experienced teachers are primarily rewarded with the opportunity to teach more academically proficient students. As a result of this dynamic, there are significant disparities – both within and between divisions – in the characteristics of teachers who teach students from various backgrounds. (p.5)

Providing equitable access to high quality teachers is a legitimate way to reach the goal of closing the achievement gap (Berry & Darling-Hammond, 2006; Parker,

2008). But without incentive structures that recognize the challenges inherent in teaching high-need student populations, there is little reason for teachers to stay in or move to low-performing schools (Center for American Progress, 2008; Goe, Parker, Carr, & Oxnam, 2009; Southeast Center for Teaching Quality, 2004).

Origins and Development of the National Board for Professional Teaching Standards

In 1983, a critical report entitled, *A Nation at Risk: The Imperative for Educational Reform* was issued by President Ronald Reagan's National Commission on Excellence in Education, citing the decline of America's public schools. This report spawned not only concern, but also numerous reform efforts. In 1985, the president of the American Federation of Teachers, a teaching union, called for the formation of a teacher-driven evaluation board to quantify high quality teaching standards (NBPTS, 2010b).

The Carnegie Forum on Education and the Economy's Task Force on Teaching as a Profession issued a report entitled *A Nation Prepared: Teachers for the 21st Century* (Carnegie Corporation, 1986). Through the elevation of the profession, the taskforce believed teacher quality would improve (National Board for Professional Teaching Standards, 2010a). The National Board for Professional Teaching Standards was created with funding from the Carnegie Corporation of New York with the tri-fold mission of

> maintaining high and rigorous standards for what accomplished teachers should know and be able to do; providing a national voluntary system certifying teachers who meet these standards; [and] advocating related education reforms to

> integrate National Board Certification in American education and to capitalize on the expertise of National Board Certified Teachers. (NBPTS, 2002, p.1)

While state licensing requirements represent minimum standards for teacher certification, the intention of the NBPTS credential was to provide an elevated level of professional distinction (Humphrey, Koppich, & Hough, 2005) and establish a career ladder within teaching ranks (Koppich, Humphrey, & Hough, 2007).

Interestingly, the plan that resulted from the taskforce acknowledged the possibility of the NBPTS credential leading to exacerbated inequities. This plan stated,

> Within districts, the most experienced teachers are often assigned to the most promising students. Incentives at every level should be designed to ensure that the students most in need of help are taught by many of the best and most experienced teachers. (Carnegie Forum on Teaching as a Profession, 1986, p.103)

The taskforce articulated the importance of offering salary supplements to teachers working in high-need areas or designing policies to establish an equitable distribution of high quality teachers (Carnegie Forum on Teaching as a Profession, 1986).

Koppich, Humphrey, and Hough (2007) reported that the founders of NBPTS recognized “a need to induce [NBCTs] to go to difficult schools” in the form of financial incentives that either states and/or school districts would provide. These founders expressed awareness of the fact that the NBPTS credential would “make existing structures [and inequities] more visible” if not addressed proactively through incentive policies.

The federal government has provided over $120 million in support of the organization (Ballou, 2003), and philanthropic foundations, states and localities have made substantial investments as well. As of 2010, the number of NBCTs stood at over 82,000 (NBPTS, 2010c), and almost every state in the nation and over a quarter of school districts offered incentives to pursue certification and/or monetary compensation for successful achievement of the credential (Humphrey, Koppich, & Hough, 2005). However, currently very few states or districts structure targeted incentives to increase equity in the distribution of and the access to National Board Certified Teachers for underserved populations, opting instead to let labor market forces run their course (Berry & Rasberry, 2007; Goldhaber, Choi, & Cramer, 2004; Koppich, Humphrey, & Hough, 2007; Rotherham, 2004).

National Board Certification as an Indicator of Quality

According to Linda Cavalluzzo (2004), "although there is general agreement among policymakers, educators, and researchers that teacher quality is key to student success, there is less agreement about the contribution that specific professional attributes make to good teaching" (p.1). Most state departments of education recognize National Board Certification as an avenue to achieving highly-qualified status under No Child Left Behind (NBPTS, 2010c). Some research supports the assertion that NBCTs were significantly more effective than their non-certified counterparts (Bond, Smith, Baker, & Hattie, 2000; Cavalluzzo, 2004; Goldhaber & Hansen, 2009; Goldhaber, Perry, & Anthony, 2004; Kelley & Kimball, 2001), while other studies indicate more mixed results regarding the teacher quality implied by successful attainment of the NBPTS credential (Alday, 2011; Rotherham, 2004; Sanders, Ashton, & Wright, 2005). Ballou

(2003) argued that the NBPTS credentialing process is flawed and in need of reform, citing the conflicting goals of professional development and evaluation. On-going research is needed to assess the validity of teacher quality definitions (Berry & Darling-Hammond, 2006), but educators generally hold the National Board Certification process in high-regard (Kelley & Kimball, 2001).

Impact of the Credential on One's Career

With consideration of teacher mobility, Goldhaber, Choi, and Cramer (2004) found NBCTs to be less likely to change districts, but this behavior might be explained by the idea that NBCTs may have already been teaching in schools with positive working conditions. Of those that do transfer to new schools or move to other districts, the movement tended to shift NBCTs into "more affluent communities, with more favorable working conditions," (p.18) as the theoretical model for this study implies. The researchers suggest "the very act of labeling of teachers as highly effective may change labor market dynamics." (p.6) The NBCT label increases the perception of quality, making them more desirable in the broader labor market, giving these teachers a greater negotiating ability over their work assignments.

Goldhaber and Hansen (2009) found that the NBPTS process impacted movement within the state of North Carolina. Almost all teachers associated with the NBPTS process demonstrated increased mobility within the state when compared with teachers who had not applied. However, no evidence suggested that obtaining the NBPTS credential in and of itself had an impact on teachers changing districts. With regards to movements out of the state, the analysis showed applicants and re-applicants left the state much less often than non-applicants, implying that association

with the process increased a teachers' commitment to the North Carolina public school system. In contrast however, when the researchers examined the behaviors of the applicant group more closely, a different trend emerged. In comparing the behavior of applicants at two points in time, before and after applying to NBPTS, successful applicants (or NBCTs) substantially increased their likelihood of leaving the state system, signaling that earning the credential may increase career mobility.

Demographic variables related to school communities also may have impacted teachers' career decisions, as Goldhaber and Hansen (2009) reported evidence in increased mobility among successful NBCTs previously working in schools with higher levels of minority students. It seemed the elevated status enabled them to transfer to schools with less poverty and a smaller proportion of minority students. The researchers noticed this phenomenon strongly in Charlotte-Mecklenburg Schools, the largest high-minority school district located on the border of South Carolina. They found a significant portion of NBCT exits from the North Carolina system occurred from this school district. The financial rewards offered to NBCTs in South Carolina may have served as an inducement for these educators, allowing the state of South Carolina to effectively recruit NBCTs from Charlotte-Mecklenburg without having to bear the financial responsibility for sponsoring teacher participation in the NBPTS process.

With regards to leaving the classroom, Goldhaber and Hansen (2009) found that a surprisingly small number of NBCTs left teaching to join administrative ranks. Since the NBPTS credential may signal teacher quality and an aptitude for instructional leadership, this lack of movement into administration was surprising. However, given the magnitude of work necessary to attain NBPTS credentialing, teachers who

embarked upon the challenge are likely committed to classroom teaching for a significant number of years, especially since salary bonuses for the certification only applied if teachers remained in classrooms (Goldhaber & Hansen, 2009).

According to Goldhaber, Choi, and Cramer (2004),

> understanding whether and how NBPTS certification affects teachers' career paths is essential, given mounting evidence of the importance of teacher quality in determining student outcomes, and strong theoretical reasons to believe that certification would affect the distribution of teachers across schools and districts. Recent research…has shown NBCTs to produce larger learning gains among students, thus the sorting of teachers across students is an important quality equity issue. It is also a matter of financial equity, since many states explicitly promote NBPTS certification by financing the cost of the NBPTS assessment and providing additional compensation to those who become certified. Consequently, these state-level resources flow to those districts and schools employing NBCTs…creating an implicit subsidy. (p.2)

The Distribution of NBCTs

Goldhaber, Choi, and Cramer (2004) conducted a descriptive analysis on the distribution of NBCTs in North Carolina, the state with both the largest number and percentages of NBCTs. Through the use of an extensive data set of all teachers in the state over a four-year period, the researchers looked for signs of inequality in distribution of NBCTs on the district, school, and classroom levels.

Distribution disparities occurred at the district level, with a strong positive relationship between the presence of NBCTs and the offering of district-level incentives,

higher per-pupil costs, and competitive starting teacher salaries as well as high student achievement, and student populations with fewer minorities, fewer special education students, and fewer students eligible for free or reduced price lunch. Many of the findings were similar at the school and classroom levels in that NBCTs tended to work in schools and with students with similar characteristics with regards to achievement, race/ethnicity, learning disabilities, and socioeconomic status. At the classroom level, the researchers found NBCTs were far more likely to be teaching higher performing, non-minority students, with a full standard deviation of difference in the average reading and math test scores of students taught by their non-NBPTS credentialed colleagues (Goldhaber, Choi, & Cramer, 2004).

Goldhaber, Choi, and Cramer (2004) concluded that the greatest variation existed between schools within districts, implying that "the sorting of NBCTs is driven more by differences in school characteristics than district characteristics" (p.12). Since most districts pay on a uniform salary scale and incentives for NBCTs are applied generally, there was no additional incentive for NBCTs to take teaching assignments in challenging schools with underserved populations of students. Researchers included a measure of the likelihood of students to be exposed to instruction by a NBCT and determined a much higher proportion of students in high-achieving, affluent districts and schools had exposure to NBCTs than students in low achieving, less-affluent districts and schools. A stark contrast emerged with regards to race/ethnicity. Non-minority students were found to be nearly 30% more likely to have an NBCT than minority students. Goldhaber, Choi, and Cramer (2004) asserted that the NBPTS credential may actually further complicate pre-existing inequalities in the distribution of teachers,

as the NBCT label may give these teachers greater bargaining power in their teaching placements. Goldhaber, Choi, and Cramer (2004) hypothesized

> more affluent districts would presumably be in a better position to target NBCTs for recruitment than less affluent districts, and may in fact craft financial incentive explicitly designed to encourage the growth of NBCTs within the district, or aid in the recruitment of NBCTs from other districts. (p.6)

A further study of teachers in North Carolina by Goldhaber, Perry, and Anthony (2004) confirmed the trends discovered by Goldhaber, Choi, and Cramer (2004). With regards to school and district characteristics, successful NBCTs tended to teach in mostly homogenously White communities with low rates of poverty, higher student performance, more residents with high educational levels, and higher median housing levels. Impoverished communities did not have a proportionate amount of NBCTs, but it is unclear exactly why. Goldhaber, Perry, and Anthony suggest teachers in more affluent, high-achieving districts are more likely to apply to and achieve successful certification through NBPTS because teachers in more challenging environments have a harder time obtaining certification due to community or personal factors (2004).

In a study of 20,000 teachers in the six states with the largest number of NBCTs earning their credential between 1998 and 2003, Humphrey, Koppich, and Hough found that 12% of NBCTs taught in schools with 75% or more of students eligible for free or reduced lunch. All told, only 19% of NBCTs worked in schools with history of low-performance (Humphrey, Koppich, & Hough, 2005). The state of California had the most equitable distribution of NBCTs among the six states with the largest number of teachers holding the credential, perhaps as a result of their targeted incentive structure.

As opposed to a general incentive such as the ones in North Carolina and Virginia, California only provided a stipend to NBCTs who chose to work in low-performing schools. At $20,000 over four years, this stipend significantly increased the take-home pay of NBCTs in these challenging settings, perhaps making the job more desirable (Humphrey, Koppich, & Hough, 2005).

Effectiveness of Incentives

Goldhaber, Perry, and Anthony (2004) reported that in North Carolina, a state that offers a blanket incentive for NBCTs regardless of teaching assignment, state-level resources flow to more affluent districts and schools that have higher achieving students, exacerbating the inequities that already exist. Goldhaber, Choi, and Cramer (2004) assert that in the absence of targeted incentives for NBCTs to work in high-need schools and districts "teachers tend to follow the general inequitable sorting patterns observed in the teacher labor market at large" (p.20). Goe, Parker, Carr, and Oxnam (2009) assert that "tying tuition reimbursements and financial incentives to teachers' employment in specific schools – not just employment in the profession – is critical" (p.84) to ensuring that incentive efforts are effective at improving equity for underserved populations. The implementation of most states' incentive programs for NBCTs may actually inadvertently undermine efforts to work towards a more equitable distribution of this human resource, one of the stated goals of NBPTS (Goldhaber, Choi, & Cramer, 2004).

Kelley and Kimball (2001) found that, generally speaking, pay increases interest in, understanding of, and appreciation for the National Board process. Goldhaber, Perry, and Anthony (2004) discovered that districts offering additional financial incentives

beyond the 12% salary increase provided by the state of North Carolina experienced higher application rates to NBPTS than districts that did not offer such programs. Koppich, Humphrey, and Hough (2007) reported that, in conjunction with other local support programs, state and district-level financial incentive structures that target low-performing schools may result in a more equitable distribution of NBCTs.

Another study focusing on gender concluded that women speak very reluctantly and apologetically if at all about the role of money as a motivator for pursuing the NBPTS credential. Men, however talk very directly about the role of money as a motivator without shame (Johnson, et al., 2005). Women, however, disproportionately take advantage of the National Board process despite reporting, significantly more so than male candidates, negative aspects of engaging in the process such as stress on themselves and their families (Johnson, et al., 2005).

It is worth noting financial incentives alone may not overcome the problem of inequities. Koppich, Humphrey, and Hough (2007) surveyed NBCTs to determine what conditions would have to be in place for them to choose to work in challenging school environments. Participants reported “premium pay” (p.18) would play a role, but they placed even greater emphasis on non-pecuniary job characteristics such as “having an excellent principal, collaborative colleagues, and the availability of adequate instructional resources” (p.18). This suggests that money plays a role, but work conditions that facilitate success are also critical to impacting change.

Instead of relying on recruitment efforts of NBCTs from other districts alone, school systems may also wish to “home grow” their NBCTs, as this may positively impact the supply of NBCTs in low-performing schools. However, Goldhaber, Perry and

Anthony (2004) reported that the environment in which teachers work might serve as either a motivating or de-motivating factor for participation in the NBPTS credentialing process. Lighter workloads in affluent schools and peer encouragement from successful NBCTs may facilitate successful attainment of NBPTS credential. Conversely the stress of challenging assignments and the lack of successful NBCT role models may stifle a teacher's confidence in their ability to attain the credential successfully. In this scenario, financial incentives alone may not overcome the factors related to teachers' work context that might discourage NBPTS participation. However, the responsiveness of teachers to financial incentives should not be ignored.

California's Incentive Structures

In 1998, the state of California implemented a policy stipulating that all NBCTs would receive a $10,000 annual award for achieving the credential, regardless of the context of their teaching assignment (Koppich, Humphrey, & Hough, 2007). According to Kay Garcia, NBPTS Regional Outreach Director and former employee of the California Department of Education, in 2000, the state decided to provide fee reimbursement up to $1,000 for all applicants as well as an additional $20,000 bonus for NBCTs choosing to work in low-performing schools paid in increments of $5,000 made over four consecutive years (K. Garcia, personal communication, July 1, 2011). In 2003, the $10,000 general state award was discontinued due to declining state budgets, (K. Garcia, personal communication, July 1, 2011) however, the state maintained the targeted $20,000 award. When Humphrey, Koppich, and Hough (2005) examined the distribution of NBCTs in six states with the highest number of successful NBPTS candidates, California was the only state with a conditional award promoting equity, and

it was also the only state with “a higher proportion of NBCTs work[ing] in schools with high concentrations of minority students, compared with the state’s average for all teachers” (p.11). Specifically, the Los Angeles Unified School District boasted significant proportions of NBCTs, which can likely be attributed to a third layer of financial reward in the form of a district-wide bonus as well as two support programs that specifically recruit teachers already working in low-performing schools who wish to pursue certification and remain in their schools upon successful attainment (Koppich, Humphrey, & Hough, 2007).

Virginia’s Incentive Structures

In 1999, Virginia’s General Assembly passed a bill, known as the Teacher Certification Incentive Reward Program and Fund, to establish a fund and related guidelines for awarding incentives to National Board Certified Teachers in the Commonwealth (Alday, 2011). After numerous revisions, the bill read:

> To the extent funds are available in the Fund, teachers who obtain national certification shall receive an initial state-funded award of $5,000 and a subsequent award of $2,500 each year for the life of the certificate. Such awards will continue to be paid upon renewal of the certificate. The Board [of Education] shall establish procedures for determining amounts of awards if the moneys in the Fund are not sufficient to award each eligible teacher the appropriate award amount. (National Teacher Certification Incentive Reward Program and Fund, 1999)

In earlier iterations, the incentive for NBCTs was couched in House Bill 2710, the Education Accountability and Quality Enhancement Act of 1999, which proposed that in exchange for the award, recipients would

> …agree to assist the relevant employing division school boards with certain instructional services, which may include, but shall not be limited to, serving on instructional personnel professional development committees, providing workshops on instructional methodologies, or assisting other candidates in seeking national certification. (House Bill 2710, 1999)

Once this section regarding instructional service was struck from the legislation, no wording remained about any responsibilities of NBCTs to give back to the locality, division, or state in return for the financial award. Virginia's state-level NBCT award differs starkly from that of California's in that no expectations are communicated regarding the responsibility of recipients in Virginia, while California's award is only dispersed to NBCTs who opt to work in low-performing schools. According to Alday (2011), only one Virginia school division offered a local incentive based on school assignment. Fairfax County offered a $1,750 award for NBCTs for teachers generally and an additional $1,750 for NBCTs who work in high-risk schools. As of the 2009-2010 school year, this targeted award was discontinued. Given the contrast and variation in state and local incentive structures, the resulting distribution of NBCTs within and among Virginia's 132 school divisions is of interest to examine.

Additionally, NBPTS receives a grant from the United States Department of Education to provide partial financial assistance with the NBPTS application costs. In Virginia, this grant is administered by VDOE and provides $1,250 through the Candidate

Subsidy Program for as many teacher candidates as possible, again, regardless of teaching assignment (VDOE, 2011c).

Literature Review Synthesis

In Chapter 2, the researcher examined literature surrounding the following themes: (a) de facto segregation, (b) the characteristics of schools and districts where teachers desire to work, (c) the quality of teachers in underserved areas, (d) the origins and development of the NBPTS (e) National Board Certification as an indicator of quality, (f) the impact of the credential on one's career, (g) the distribution of NBCTs, (h) the effectiveness of incentives, (i) California's incentive structures, and (j) Virginia's incentive structures. This organization and progression constructs a chain of logic and establishes a theoretical framework for the study.

Disparities between and among school communities exist mostly along lines of race/ethnicity and poverty, and unsurprisingly, measures of teacher quality follow similar patterns (Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Koppich, Humphrey, & Hough, 2007; Parker, 2008; Weinberg, 1967). Teachers seek and prefer work environments close to home that mirror their hometowns (Boyd, Lankford, Loeb, & Wyckoff, 2005). Preferred schools and divisions are characterized by higher salaries, competitive benefits packages, and positive work conditions such as small class size, planning time, high-quality facilities, availability of instructional resources, and low-minority and low-poverty student body demographics (Balter & Duncombe, 2008; Bracey & Molnar, 2003; Lankford, Loeb, & Wyckoff, 2002). School districts have different financial resources to devote to recruiting top teaching talent, and disadvantaged districts typically pay less (Darling-

Hammond & Sykes, 2004). While there is often variation in school characteristics within a district, most school systems pay all teachers uniformly, ignoring the context of the challenges embedded in different teaching assignments and reinforcing the status quo, where high quality teachers naturally gravitate towards the most favorable work environments (Berry & Rasberry, 2007; Goldhaber, Choi, & Cramer, 2004; Koppich, Humphrey, & Hough, 2007; Rotherham, 2004).

While the quality of NBC is debated in literature, the process receives broad support and regard among educators (Kelly & Kimball, 2001). Regardless, the financial compensation attached to the credential in most states signals and implies quality. Since this is an application of public resources, an examination of how the money is distributed is logical, reasonable, and justifiable.

Barring a change in compensation structures, many educational policy researchers, labor economists, and even the NBPTS agree that there is potential for professional distinctions such as NBC to actually further disadvantage struggling schools in their quest to recruit and retain high quality educators (Carnegie Forum on Teaching as a Profession, 1986; Goldhaber, Choi, & Cramer, 2004; Goldhaber, Perry, & Anthony, 2004; Koppich, Humphrey, & Hough, 2007). Most states and school districts provide general support and incentives to NBCTs, which are blind to the rigors and challenges of working in high-poverty and high-minority schools (Berry & Rasberry, 2007; Goldhaber, Choi, & Cramer, 2004; Koppich, Humphrey, & Hough, 2007; Rotherham, 2004). By examining the distribution of NBCTs in Virginia, one such state that lacks targeted incentive structures, the researcher can provide a baseline of the human resource distribution for use in future policy development.

Chapter 3 – Methodology

Purpose

The purpose of this study is to provide a baseline description of the distribution of National Board Certified Teachers in the Commonwealth of Virginia, the incentive structures of the school divisions in which they work, and the characteristics of the student populations in the schools in which NBCTs serve, specifically race/ethnicity and socioeconomic status. School leaders and policy makers can use these baseline data to address inequities in human resource distribution.

Research Questions

In this study, the researcher sought to answer three research questions: How are NBCTs distributed across the Commonwealth with regards to divisions' ability to pay? In school divisions with a high concentration of NBCTs, what incentive structures do these divisions offer to support teachers while they apply to NBPTS and/or to recruit and retain previously successful NBCTs? What are the characteristics of the schools in which NBCTs serve with regards to student race/ethnicity and socioeconomic status?

Research Design

A quantitative analysis was employed to best address the research questions. First, through data obtained from the Virginia Department of Education (VDOE), a state-level analysis revealed the number of NBCTs employed in each school in each division. Secondly, the divisions' ability to pay, as measured by the Local Composite Index (LCI), and the incentives they offer to support, attract, and retain NBCTs were reported relative to the number and percentage of NBCTs in each division. Finally, the analysis narrowed further by reporting the percentage and concentration of NBCTs by school as

well as the race/ethnicity and socioeconomic status students served in the schools where NBCTs chose to work.

The quantitative approach allowed the researcher to look at a very broad population, all of the schools and divisions in the Commonwealth of Virginia as well as all NBCTs eligible for the state stipend working in K-12 public settings, and examine trends in labor market forces on a large scale. The use of state and federal-level data also strengthened this methodology, as the standardization of reporting provides a great deal of uniformity to the data collection process.

Site Selection

Virginia was chosen for a number of reasons. First, some state-level incentives are provided in the form of $1,000 in reimbursement for application costs, a one-time $5,000 stipend awarded upon successful attainment, and an annual $2,500 stipend awarded for the life of the certificate (National Board for Professional Teaching Standards Advocacy Link, 2008; VDOE, 2011c). So long as funding is available, these incentives are provided to eligible teachers across the state regardless of the context of their teaching assignments. Unlike the targeted California model, no more or less monies are offered to teachers working with underserved populations, but instead, the incentives are available to all who qualify.

In addition to state-issued incentives, most school divisions offer local incentives to support their teachers throughout the application process and/or to recruit and retain NBCTs for the district. Alday (2011) reported that of 132 Virginia school divisions, 26% of divisions offer no incentives or support; 27% offer paid professional leave during the application process; 14% offer a support network through workshops, seminars, and/or

financial support towards a course; 27% pay for all or part of the application fee; and 52% offer financial compensation beyond the state's award for NBCTs. Only one school division in Virginia differentiated financial incentive based on the challenge of school-level placement, but this targeted incentive ended in the 2009-2010 school year.

By matching the distribution of NBCTs across the Commonwealth to the presence of broadly offered division-level incentives and a division's ability to pay, the researcher examined the sorting of NBCTs based on the wealth of the division. In matching NBCTs to individual school and student demographics, the researcher gained insight into choices NBCTs made related to the sorting among and within divisions.

Interesting regional variation exists within Virginia, as it encompasses the major metropolitan areas of Richmond, Hampton Roads, and Washington, D.C., parts of Appalachia, and everything in between with regards to geography and demography. This diversity provided a fascinating backdrop against which to examine the distribution of NBCTs.

According to NBPTS, a total of 2,180 NBCTs taught in the Commonwealth in 2010, with 184 of that total having achieved the credential in 2009 (NBPTS, 2011). This 9.2% increase represented heightened interest in NBC and successful applications in Virginia, nearly mirroring the growth at the national level at 10.5% (NBPTS, 2011).

This growth in a time of declining financial resources at the federal, state, and local levels may eventually translate into policy changes and a reprioritization of financial incentives. Other funding sources may need to be identified, awards may be discontinued, or the qualifications for receiving compensation may be changed to target resources more specifically. Recognizing where NBCTs are teaching and how they

contribute to student success may help provide valuable background information in fiscal decisions.

Population

The population for this study was all NBCTs with active certificates working in public schools and divisions in the Commonwealth of Virginia in the 2010-2011 school year. All NBCTs in any endorsement area working with students in these organizations at least 50% of the time were included in this statewide analysis. It is assumed that all NBCTs working in a school and division brought their talents to bear in their various roles – classroom, resource teachers, counselors, and librarians alike – and as a result, data for all available NBCTs were included.

Data Collection Procedures

To obtain data necessary for analysis, a number of pre-existing data sources were utilized. A plan for data acquisition was developed to address each research question below.

Question 1: How are NBCTs distributed across the Commonwealth of Virginia with regards to divisions' ability to pay?

Since the Virginia Department of Education (VDOE) pays the state stipend to NBCTs, the department had a record of teachers receiving the award and the school location in which they were employed. The researcher formally requested the raw numbers of NBCTs and the total number of teachers by school and division.

The state publishes the Local Composite Index for all Virginia school divisions. This information is updated every two years and is available on the VDOE website. LCI served as a measure of a division's ability to pay, while the percentage of free/reduced

lunch-eligible students approximated ability to pay at the school level.

Question 2: In school divisions with a high concentration of NBCTs, what incentive structures do these divisions offer to either support teachers while they apply to NBPTS or to recruit and retain previously successful NBCTs?

Alday (2011) compiled a directory of incentives, including divisions that offer no incentives, creating a full picture of the offerings, or lack thereof, across the Commonwealth.

Question 3: What are the characteristics of the schools in which NBCTs serve with regards to the race/ethnicity and socioeconomic status of their student populations?

The Virginia Department of Education publishes reports on Fall Student Enrollment and demographics (including race/ethnicity) as well as National School Lunch Program Free and Reduced Price Eligibility. For both sources, school and division level data from the 2002-03 through 2010-11 are available for download through the VDOE website. Specifically, the data from the 2010-11 school year were included.

Time Line for Gathering, Treatment, and Management of Data

Upon obtaining committee approval in August of 2011, the researcher submitted the appropriate paperwork to the Institutional Review Board (IRB) of Virginia Polytechnic Institute and State University. After receiving IRB approval on October 17, 2011 (Appendix A), the researcher requested the necessary information from the VDOE regarding the number and school-level work assignments of NBCTs across the state in the 2010-2011 school year. The researcher requested that any personally identifiable

information be removed from the report such as teacher names, social security numbers, or license numbers.

While waiting for a response from the VDOE, the researcher began the process of data management, aggregating student population characteristics by school and division from the readily available data sources on the VDOE website into Microsoft Excel and SPSS, data management software tools. The researcher also initiated a professional connection with two collaborators from Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis (LISA) in preparation for the data management and analysis tasks. By December of 2011, all necessary data were collected digitally in preparation for statistical analysis. A final report was issued in March of 2012.

Data Analysis

The researcher utilized Microsoft Excel and SPSS, a software system to aid in the management of the large data set and enable the researcher to conduct accurate statistical analyses in an efficient manner. Analyses included various forms of descriptive and inferential statistics. Frequency plots and percentages were used to describe the distribution of NBCTs, and correlation and regression were used to predict the likelihood of NBCTs' presence based on division and school-level factors.

Methodology Summary

Culling data from existing data warehouses with state and national credibility allowed the researcher to directly address the research questions without concerns about validity and bias in the data collection process. The proposed methodology yielded information about the distribution of highly quality teachers that will serve as a baseline from which to work in targeting initiatives that might be needed to address

equity. This information could potentially impact local and state policy regarding equity in the distribution and recruitment of high quality educators, specifically NBCTs.

Chapter 4 – Results

Purpose of the study

Through data mining and quantitative analysis, the researcher sought to obtain a baseline measure of the distribution of National Board Certified Teachers in the Commonwealth of Virginia, the incentive structures of the school divisions in which they worked, and the demographic characteristics of the student populations in the schools in which they served.

Question 1: How are NBCTs distributed across the Commonwealth of Virginia with regards to divisions' ability to pay?

The researcher first conducted an analysis on the frequency distribution of NBCTs as well as measures of central tendency and dispersion to assess patterns and trends in the data. The data set had a wide range of values and a mode of 0, as 31 divisions did not employ any NBCTs in the 2010-2011 school year. These 31 divisions represent about 24% of divisions across the Commonwealth's total of 132. On the other end of the spectrum, five divisions employed 100 or more NBCTs, 12 divisions employed 50 or more, and 33 divisions employed 10 or more. When examined as a whole, the data are positively skewed, with a high number of low values, as seen in Figure 1.

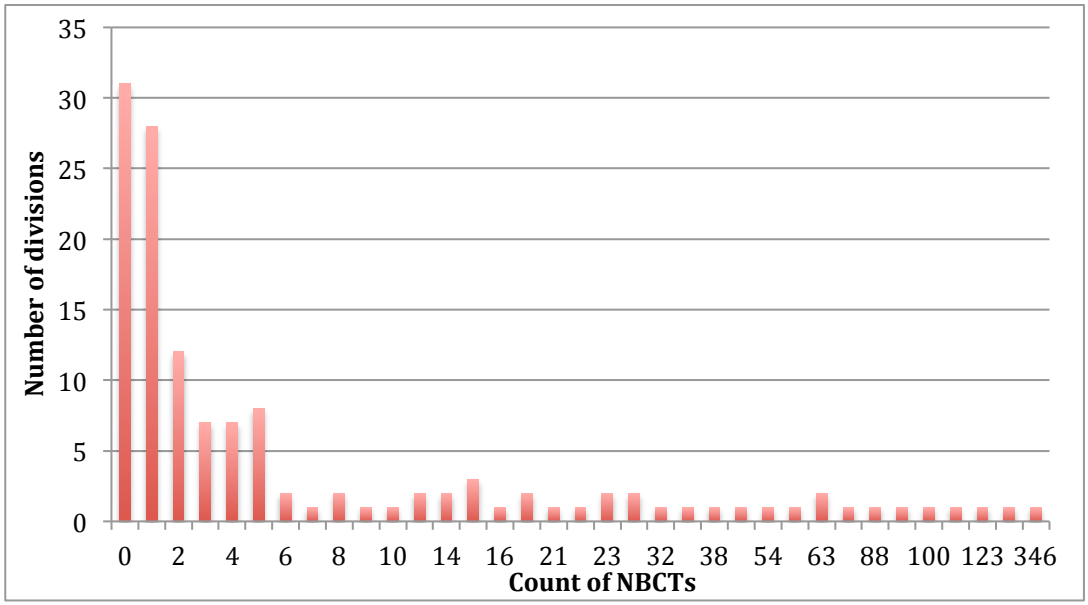

Figure 1. Frequency Distribution of NBCTs in Virginia Public School Divisions

Table 1 shows the thirty-three divisions that employed 10 or more NBCTs, or one quarter of Virginia's 132 public school divisions, employed over 90% of the total number NBCTs in the Commonwealth, indicating an uneven distribution of NBCTs before divisions' ability to pay was analyzed. LCI values are also included in Table 1, for reference.

The researcher then divided LCI values into graduated segments, indicating ranges of divisions' ability to pay. Calculated LCI values for the 2010-2011 school year ranged from .1692 in the most needy division to .8, the capped maximum value indicating a high ability to pay. Values of LCI were divided by tenths into seven distinct segments, as displayed in Table 2. A complete list of all Virginia divisions and their corresponding LCI value is included in Appendix B.

Table 1

LCI Values for Virginia Public School Divisions with 10+ NBCTs

Virginia Public School Division	# NBCTs	% of Total VA NBCTs	LCI
Fairfax County Public Schools	346	17.91%	.7126
Prince William County Public Schools	129	6.68%	.4036
Arlington County Public Schools	123	6.37%	.8000
Virginia Beach City Public Schools	102	5.28%	.4060
Hampton City Public Schools	100	5.18%	.2690
Loudoun County Public Schools	90	4.66%	.5854
Chesterfield County Public Schools	88	4.55%	.3551
Henrico County Public Schools	86	4.45%	.4370
Hanover County Public Schools	63	3.26%	.4195
Newport News City Public Schools	63	3.26%	.2778
Spotsylvania County Public Schools	57	2.95%	.3593
Stafford County Public Schools	54	2.80%	.3362
Williamsburg-James City County Public Schools	39	2.02%	.8000
Richmond City Public Schools	38	1.97%	.4945
Alexandria City Public Schools	35	1.81%	.8000
Chesapeake City Public Schools	32	1.66%	.3465
Montgomery County Public Schools	27	1.40%	.3549
Roanoke City Public Schools	27	1.40%	.3582
Fauquier County Public Schools	23	1.19%	.6097
Salem City Public Schools	23	1.19%	.3516
Manassas City Public Schools	22	1.14%	.4005
Franklin County Public Schools	21	1.09%	.4011
York County Public Schools	19	0.98%	.3727
Norfolk City Public Schools	19	0.98%	.3004
Frederick County Public Schools	16	0.83%	.3816
Albemarle County Public Schools	15	0.78%	.3753
Botetourt County Public Schools	15	0.78%	.3682
Rockingham County Public Schools	15	0.78%	.3489
Roanoke County Public Schools	14	0.72%	.3460
Falls Church City Public Schools	14	0.72%	.8000
Gloucester County Public Schools	11	0.57%	.3703
Manassas Park City Public Schools	11	0.57%	.3311
Isle of Wight County Public Schools	10	0.52%	.3926
Total	1,747	90.42%	

Table 2

NBCTs in Virginia Public School Divisions by LCI Segment

LCI Value	# of NBCTs	% of Total NBCTs	# of Divisions in Range	% of Total Divisions	Average # per Division in Range
.1 - < .2	0	0.00%	6	4.55%	0.0
.2 - < .3	225	11.65%	36	27.27%	6.3
.3 - < .4	498	25.78%	43	32.58%	11.6
.4 - < .5	497	25.72%	20	15.15%	24.9
.5 - < .6	104	5.38%	10	7.58%	10.4
.6 - < .7	41	2.12%	4	3.03%	10.3
.7 - .8	567	29.35%	13	9.85%	43.6

Figure 2 displays the distribution of NBCTs in divisions by LCI segment. No NBCTs were employed in divisions in the lowest LCI segment, whereas the greatest number of NBCTs, 567, was employed in the divisions with the highest LCI values. Thirteen divisions possessed LCI values of .7 through .8, representing approximately 10% of the total 132 divisions. This segment of Virginia's divisions with the highest ability to pay employed nearly 30% of the NBCTs. The range in the number of NBCTs each division employs is widest in this highest tier, ranging from 0 to 346 NBCTs. Three divisions, all with the highest possible LCI value of .8 have no NBCTs. The other six divisions sharing this .8 value have between one and 123 NBCTs. Fairfax County Public Schools boasts the largest number of NBCTs by far at 346 with a corresponding LCI value of .7126.

Only about 7.5 percent of NBCTs across the state were employed in divisions with LCI values in the two segments comprising .5 - < .7, but upon further examination, only 14 divisions had LCI values in these two segments. A majority of school divisions have LCI values in the .2 - < .3 and .3 - < .4 ranges, 36 and 43 respectively, or about

60% of Virginia's 132 divisions. About 37% of NBCTs are employed in these two lower-to-moderate LCI ranges, but a 23% gap still exists in the number of NBCTs employed relative to the number of divisions with this level of need. When the segments are divided into lower values (.1 - < .5) and higher values (.5 - .8), 63.15% of NBCTs in the state are employed in school divisions with values below .5 with the remaining 36.85% working in divisions with LCI values of .5 to .8.

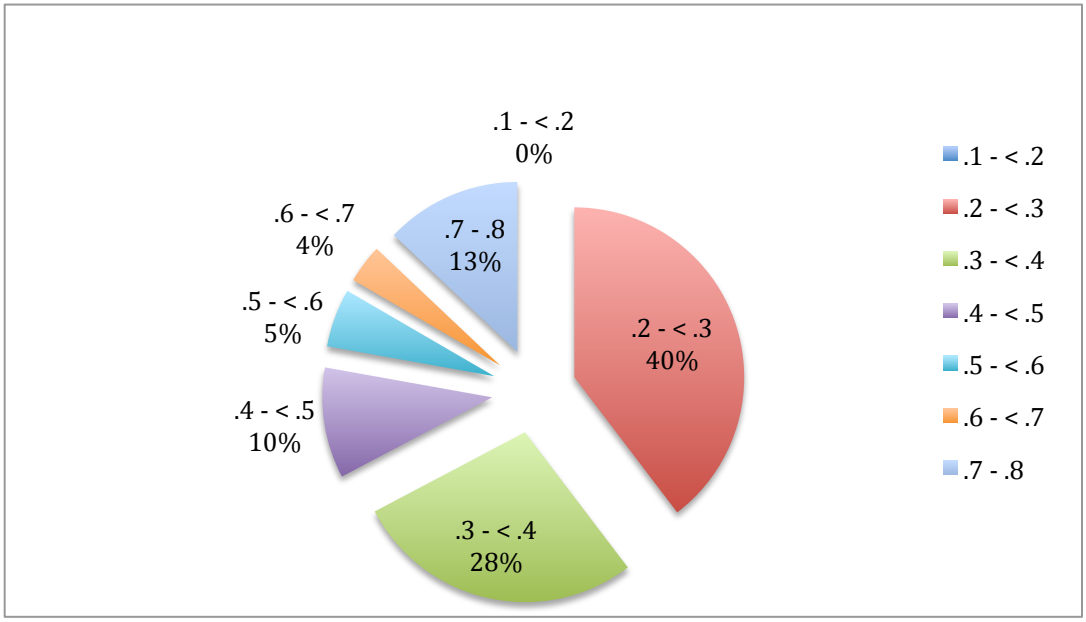

Figure 2. Percent of NBCTs by LCI Segment

When the number of divisions in each LCI segment was examined, the researcher decided to calculate an average number of NBCTs per division in the range as another way to examine equitable distribution, referenced in Table 2 and summarized in Figure 3. Again, divisions in the highest LCI bracket of .7 – .8 have the highest average number of NBCTs per division at 43.6 NBCTs with the next highest average being 24.9 NBCTs per division in the .4 - < .5 range, a difference of 18.7. As previously discussed, 60% of Virginia public school divisions have LCI values in the .2 -

< .3 and .3 - < .4 ranges, and while the raw number of NBCTs in these ranges is large, when the average number of NBCTs per division is calculated, the value seems to indicate inequality with averages of only 6.3 and 11.6 NBCTs per division. While this mean number of NBCTs does not account for the varying size of the divisions within each range, the concentration of NBCTs will be addressed in research question two.

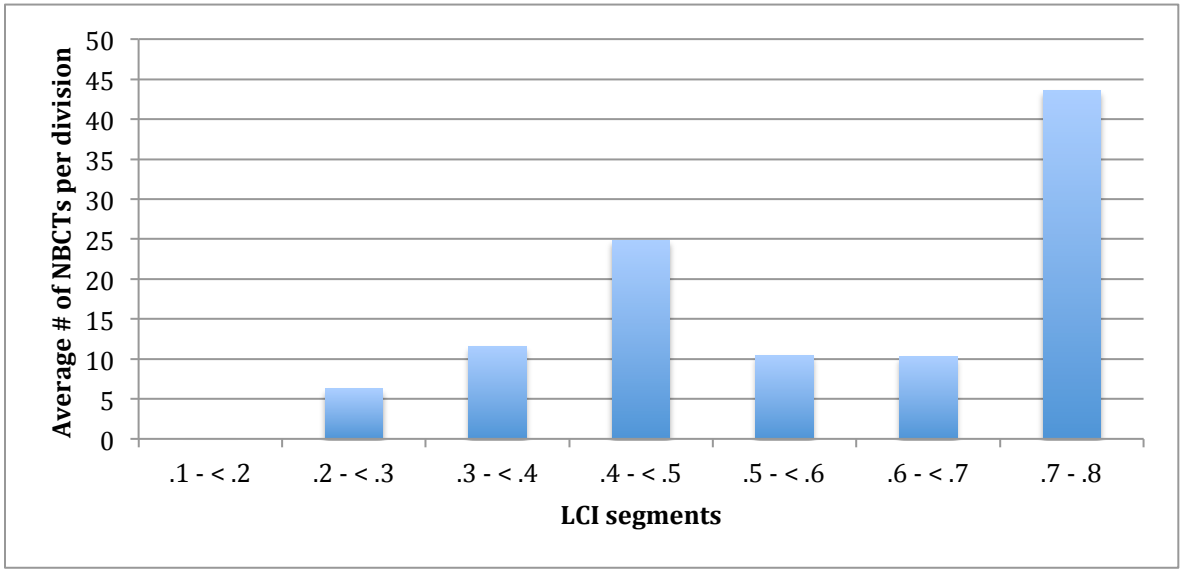

Figure 3. Average NBCTs per Division by LCI Segment

Next, the divisions with 0 NBCTs were examined for patterns, shown in Figure 4. As previously noted, none of the six divisions in the lowest .1 – < .2 range employed NBCTs in the 2010-2011 school year. Six out of 36 divisions (about 17%) in the .2 – < .3 segment had no NBCTs. Ten out of 43 divisions (about 23%) in the .3 – < .4 range, 2 out of 20 divisions (10%) in the .4 – < .5 range, 3 out of 10 divisions (30%) in the .5 - < .6 range, and 1 out of 4 divisions (25%) in the .6 – < .7 had no NBCTs working in their schools and divisions. In the most affluent segment at the top, 3 out of 13 divisions

(about 23%) in the .7 – .8 range had no NBCTs. The frequency plot of divisions with no NBCTs against LCI appears also to be positively skewed, indicating an uneven distribution of NBCTs across divisions, with the advantage being in favor of divisions with higher ability to pay.

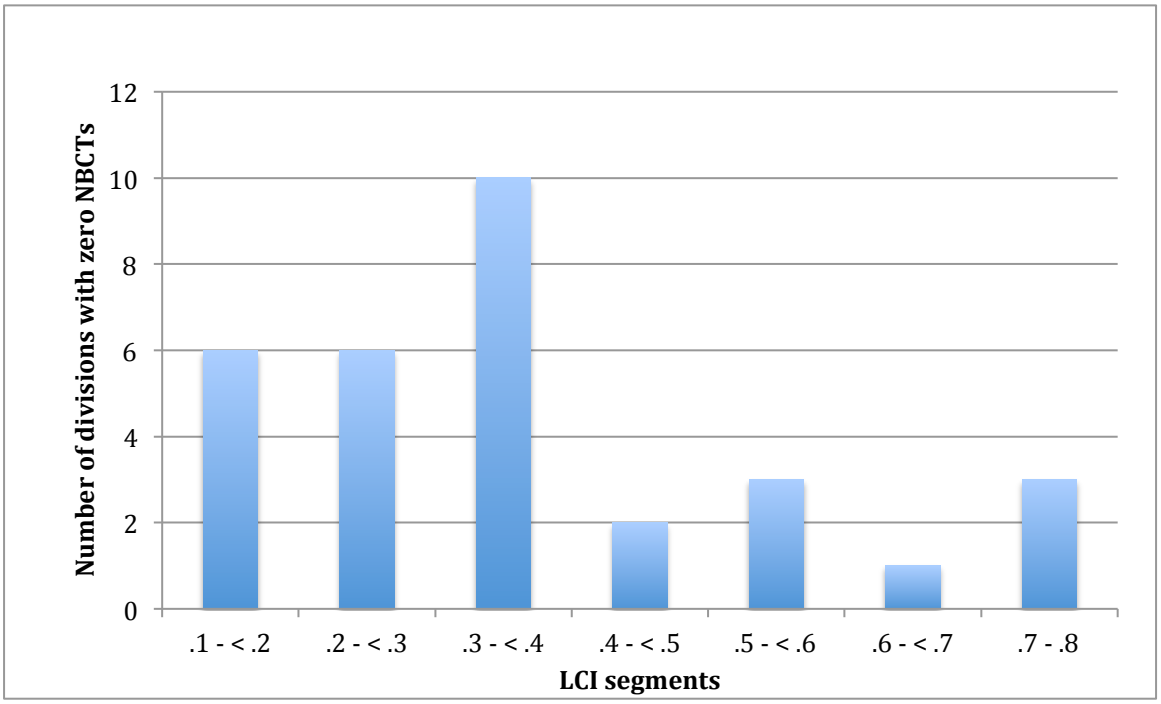

Figure 4. Virginia Public School Divisions with Zero NBCTs by LCI Segment

The researcher ultimately wanted to determine the relationship or correlation between a division's ability to pay and the presence or likelihood of employing NBCTs, but traditional calculations of linear regression were not appropriate statistical procedures for this data set since the assumption of normally distributed data was not met. The positive skew of the distribution due to high frequencies of divisions with zero or low numbers of NBCTs meant that the data were not distributed normally, and other statistical procedures would need to be employed in order to gain any meaningful insight.

Poisson distributions are commonly employed to fit count data, or integers, but one shortcoming is that these distributions do not appropriately address overdispersion in data sets. Due to the high frequency of low positive integer values (zeroes, ones and twos), the model that best fit the data was a negative binomial distribution, a generalization of the Poisson regression model that allows for overdispersion. Using covariates of LCI, indicating a division's ability to pay, and student enrollment, which would control for size of a school, the negative binomial distribution modeled the number of NBCTs that would be employed in a division. Both covariates were significant at the .000 level. An r-squared value of .51156441 indicates the fitness of the model. When student enrollment was considered, there was a statistically significant relationship between LCI and the number of NBCTs employed in a division. The resulting equation of the best fit line was:

log(Number of NBCTs in Division)=0.342+1.771*(LCI)-(8.316E-5)*(Student enrollment).

This affirms descriptive analyses that indicated an unequal distribution of NBCTs across LCI segments. Appendix C compiles division level data.

Question 2: In school divisions with a high concentration of NBCTs, what incentive structures do these divisions offer to either support teachers while they apply to NBPTS or to recruit and retain previously successful NBCTs?

In order to address this question, the researcher utilized multiple measures and definitions to develop three models of NBCT concentration. Each had its own strengths and limitations, but when examined together, the models provided a better understanding of the distribution of NBCTs. The top 10% of Virginia 132 public school divisions was determined after sorting the data under each model of high concentration. The resulting top thirteen divisions are reported for each of the three high concentration

models. Divisions ranking as high-concentration by any of the three models were compiled (see Table 6) in one comprehensive list. To be thorough, the researcher also approximated an additional measure of access to NBCTs that accounted for division size against which the three models were compared.

First, pockets of high concentration were examined across the Commonwealth based on total raw numbers of NBCTs in divisions. These division counts were divided by the total number of NBCTs in Virginia to derive a percentage of the whole, and a rank-ordered list of all 132 divisions was generated (Appendix D). This model did not account for size of the divisions, but it yielded insight into the pockets of geography that attracted NBCTs. As Table 3 shows, the top 10% of highly concentrated divisions based on this definition accounted for a total of 1,301 NBCTs, over 67% of Virginia's NBCTs. Fairfax County alone employed nearly 18% of Virginia's NBCTs.

Table 3

High Concentration Divisions based on Percentage of State Total

Virginia Public School Division	# NBCTs	% of Total NBCTs in Virginia
Fairfax County Public Schools	346	17.91%
Prince William County Public Schools	129	6.68%
Arlington County Public Schools	123	6.37%
Virginia Beach City Public Schools	102	5.28%
Hampton City Public Schools	100	5.18%
Loudoun County Public Schools	90	4.66%
Chesterfield County Public Schools	88	4.55%
Henrico County Public Schools	86	4.45%
Newport News City Public Schools	63	3.26%
Hanover County Public Schools	63	3.26%
Spotsylvania County Public Schools	57	2.95%
Stafford County Public Schools	54	2.80%
Total	1,301	67.34%

Next, the researcher wanted to examine concentration relative to school division's enrollment to both account for size of the division and determine a measure of students' access to NBCTs. This measure was calculated by dividing the total number of NBCTs by the total number of students enrolled in the division. A rank-ordered list of all 132 divisions was generated (Appendix E). This model did account for size of the divisions, but due to the dramatic range in size, the measure was particularly sensitive to very large and very small numbers of NBCTs. The top 10% of highly concentrated divisions based on this definition accounted for a total of 422 NBCTs, just under 22% of Virginia's NBCTs, summarized in Table 4. Highland County ranked highest relative to student concentration with two NBCTs because of the very small student population, to which the measure is sensitive. West Point, and Radford City appear on the list for the same reason. Despite employing the largest number of NBCTs by a very wide margin, Fairfax County did not appear on this list due to the sheer size of the organization with nearly 175,000 students. In fact, using this definition of highly concentrated, Fairfax ranks 24th out of 132 divisions.

Table 4

High Concentration Divisions based on Student Population

Virginia Public School Division	# NBCTs	Student Enrollment	Concentration of NBCTs to students
Highland County Public Schools	2	238	0.008403361
Falls Church City Public Schools	14	2,084	0.00671785
West Point Public Schools	5	771	0.006485084
Salem City Public Schools	23	3,932	0.00584944
Arlington County Public Schools	123	21,485	0.005724924
Hampton City Public Schools	100	21,568	0.004636499
Manassas Park City Public Schools	11	2,957	0.003719986
Williamsburg-James City County Public Schools	39	10,857	0.003592153
Hanover County Public Schools	63	18,628	0.003382006
Radford City Public Schools	5	1,567	0.00319081
Manassas City Public Schools	22	6,986	0.003149155
Botetourt County Public Schools	15	5,009	0.00299461
Total	422	96,082	0.004392081

Third, the researcher wanted to both account for size of the division and assess pockets of high occurrence of board certification among groups of teachers. This measure was calculated by dividing the total number of NBCTs in a division by the total number of instructional personnel working in the division. A rank-ordered list of all 132 divisions was generated (Appendix F). In assessing access to NBCTs, a weakness of this model is its sensitivity to small and large values as it was for the second model based on student enrollment. The top 10% of highly concentrated divisions based on this definition accounted for a total of 443 NBCTs, just less than 23% of Virginia's NBCTs, as shown in Table 5. The total number of NBCTs obtained by the student enrollment and instructional personnel models of calculating concentrations was very similar. This is unsurprising as student enrollment and counts of instructional personnel are closely related because the Virginia's Standards of Quality dictate allowable (or

maximum) student to teacher ratios.

Again, small divisions with few NBCTs such as Highland County, West Point, and Radford City appear in the top 10% due to the model's sensitivity to a small total number of instructional personnel. Franklin County appears in the rankings for the first time with this final definition of concentration, but all other divisions in the top 10% also appear under the previous two definitions of high concentration.

Table 5

High Concentration Divisions based on Instructional Personnel

Virginia Public School Division	# NBCTs	Total Instructional Personnel	Concentration among Division Staff
West Point Public Schools	5	66	0.0758
Salem City Public Schools	23	308	0.0747
Arlington County Public Schools	123	1,696	0.0725
Falls Church City Public Schools	14	217	0.0645
Hampton City Public Schools	100	1,627	0.0615
Highland County Public Schools	2	34	0.0588
Manassas Park City Public Schools	11	202	0.0545
Williamsburg-James City County Public Schools	39	898	0.0434
Hanover County Public Schools	63	1,493	0.0422
Manassas City Public Schools	22	529	0.0416
Botetourt County Public Schools	15	403	0.0372
Radford City Public Schools	5	136	0.0368
Franklin County Public Schools	21	625	0.0336
Total	443	8,234	0.0538

Table 6 summarizes the 23 Virginia public school divisions that ranked in the top 10% of all divisions (top 13 rank out of 132 divisions) by all three definitions of high concentration, in alphabetical order. Chesterfield, Franklin, Henrico, Loudoun, Prince William, Spotsylvania, Stafford County Public Schools and Newport News and Virginia

Beach City Public Schools only make the list by one definition. Divisions qualifying as having high concentrations of NBCTs by the second two size-dependent definitions include Botetourt and Highland County Public Schools; Falls Church, Manassas, Manassas Park, Radford and Salem City Public Schools; and West Point Public Schools. Of particular interest are the four divisions that qualify as having high concentrations of NBCTs under all three models, relative to and irrespective of division size, namely Arlington, Hanover, Williamsburg-James City County Public Schools and Hampton City Public Schools.

The researcher then calculated each division's percentage of students relative to the total number in the Commonwealth of Virginia. This percentage was compared to the division's share of NBCTs across the Commonwealth, and the difference in the two percentages was determined. Divisions with a positive result had a greater share of Virginia's NBCTs than their share of Virginia's students, indicating disproportionality in favor of greater student access to NBCTs relative to the total resource across the state. Divisions with a negative result had a smaller share of Virginia's NBCTs than their share of Virginia's students, indicating unfavorable disproportionality, leading to less student access to NBCTs relative to the total resource across the state. The range in values extended from -1.72% to +4.65%. Appendix G provides a comprehensive summation of the data. Twenty of the 23 divisions considered to be high concentration by the three models set forth in this study had positive values, implying a disproportionately favorable concentration of NBCTs. Only three divisions (Chesterfield, Loudoun, and Virginia Beach) had negative values, implying that the size of the student population diluted access to NBCTs. Since 20 of the 23 divisions considered to be high

concentration were also affirmed by this measure of access, the researcher felt confident proceeding with analysis based on LCI.

Table 6

High Concentration Divisions Across Three Definitions

Virginia Public School Division	Relative to Total % in State	Relative to Student Concentration	Relative to Teacher Concentration
Alexandria City	x	✓	x
Arlington County*	✓	✓	✓
Botetourt County	x	✓	✓
Chesterfield County	✓	x	x
Fairfax County	✓	x	x
Falls Church City	x	✓	✓
Franklin County	x	x	✓
Hampton City*	✓	✓	✓
Hanover County*	✓	✓	✓
Henrico County	✓	x	x
Highland County	x	✓	✓
Loudoun County	✓	x	x
Manassas City	x	✓	✓
Manassas Park City	x	✓	✓
Newport News City	✓	x	x
Prince William County	✓	x	x
Radford City	x	✓	✓
Salem City	x	✓	✓
Spotsylvania County	✓	x	x
Stafford County	✓	x	x
Virginia Beach City	✓	x	x
West Point	x	✓	✓
Williamsburg-James City County*	✓	✓	✓

Note. Asterisk (*) indicates divisions that have high-concentrations of NBCTs in all three models.

This ranking of the top 23 showcases a substantial range in LCI, ranging from West Point Public Schools (.2667), Hampton City Public Schools (.2690) and Newport News City Public Schools (.2778) on the lower end to four divisions with .8

(Williamsburg-James City County, Alexandria City, Arlington City, and Falls Church City Public Schools) on the upper end of the LCI. As Figure 5 shows, most high concentration divisions fell in the .3 - < .4 LCI segment, followed by an equal number in the .4 - < .5 and .7 - < .8 LCI segments. None of the high concentration divisions fell in either the .1 - < .2 or .6 - < .7 segments.

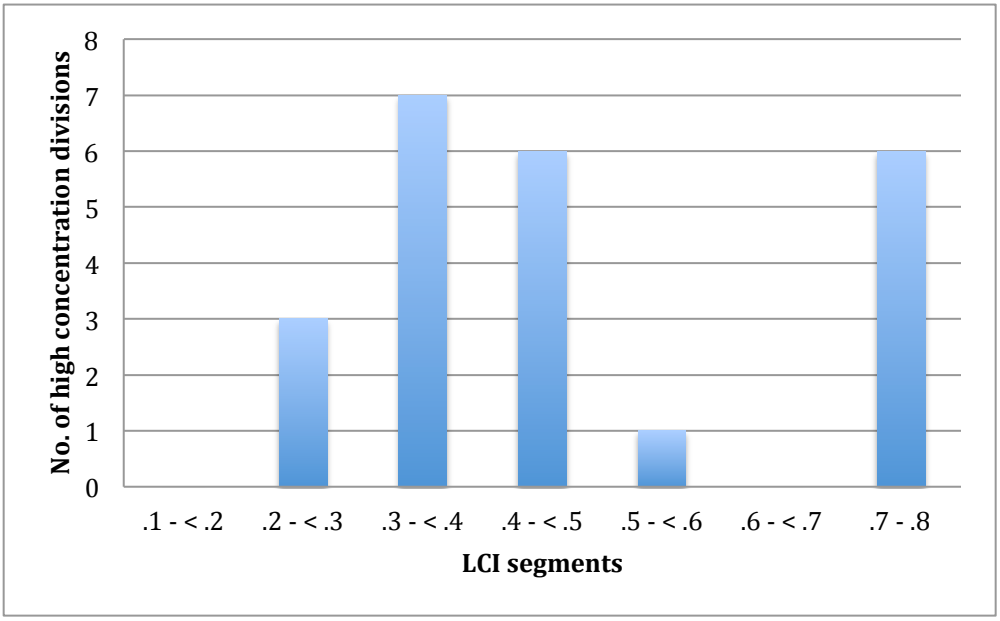

Figure 5. Distribution of High Concentration Divisions by LCI Segment

By consulting the guide to division-level incentives published in Alday's dissertation (2011), the researcher compiled descriptions of the incentives provided by these 23 divisions with high concentrations of NBCTs. The incentives Alday reported were grouped into five categories with branching subcategories: "pay" including any form of additional pay, step increase, supplement for the life of the certificate, and one time bonus; "fee assistance" including full fee coverage or reimbursement, partial or full fee coverage or reimbursement, and fee assistance for retesting; "cohort" defined as

workshops, cohorts or course; “time” defined as at least one day of professional leave; and “other” which includes technical support such as videotaping, recertification points, and miscellaneous support. Table 7 summarizes the incentives offered in high concentration divisions.

Table 7

Support/Incentive Offerings in High Concentration Divisions

Form of Support/Incentive	Number of High Concentration Divisions Offering Support/Incentive	% of High Concentration Divisions Offering Support/Incentive
Additional pay	19	83%
Supplement for life of certificate	15	65%
At least one day of professional leave	14	61%
Partial fee coverage or reimbursement	10	43%
Workshops, cohorts, or college course	9	39%
Full fee coverage or reimbursement	6	26%
Technical support (videotaping)	4	17%
Step increase	3	13%
Recertification points	3	13%
Other miscellaneous support (postage paid, professional library, exemption from evaluation)	3	13%
Fee assistance for retesting	2	9%
One time bonus	1	4%

Figure 6 summarizes the supports provided by each of the top 23 divisions, the total number and classification of supports/incentives in place in each locality, and the corresponding LCI value.

School Division	Any form of additional pay	Step increase	Supplement for life of certificate	One time bonus	Full fee coverage or reimbursement	Partial or full fee coverage or reimbursement	Fee assistance for retesting	Workshops, cohorts, or course	At least 1 day of professional leave	Technical support (videotaping)	Recertification points	Miscellaneous support	No. of supports	LCI
	Pay				Fee assistance			Cohort	Time	Other				
Alexandria City •	✓	x	✓	x	✓	✓	x	✓	✓	✓	x	x	7*	0.8000
Arlington County *	✓	✓	x	x	✓	✓	x	✓	✓	x	x	x	6*	0.8000
Botetourt County ✓	✓	x	✓	x	x	x	x	x	x	x	x	x	2•	0.3682
Chesterfield County •	✓	x	✓	x	x	✓	x	✓	✓	x	x	x	5✓	0.3551
Fairfax County •	✓	x	✓	x	x	✓	x	✓	x	x	x	x	4✓	0.7126
Falls Church City ✓	✓	x	✓	x	✓	✓	✓	x	✓	x	x	x	6*	0.8000
Franklin County •	✓	x	✓	x	x	x	x	x	x	x	x	x	2•	0.4011
Hampton City *	x	x	x	x	x	✓	x	x	x	✓	x	✓	3✓	0.2690
Hanover County *	✓	x	✓	x	x	✓	x	✓	✓	x	✓	x	6*	0.4195
Henrico County •	✓	✓	✓	x	x	✓	x	✓	✓	x	x	x	6*	0.4370
Highland County ✓	x	x	x	x	x	x	x	x	x	x	x	x	0°	0.7846
Loudoun County •	✓	x	x	✓	✓	✓	x	x	x	x	x	✓	5✓	0.5854
Manassas City ✓	✓	✓	x	x	✓	✓	x	x	✓	x	✓	x	6*	0.4005
Manassas Park City ✓	✓	x	✓	x	x	✓	✓	x	✓	x	x	x	5✓	0.3311
Newport News City •	✓	x	✓	x	x	✓	x	✓	✓	x	x	x	5✓	0.2778
Prince William County •	✓	x	✓	x	x	✓	x	x	✓	✓	x	x	5✓	0.4036
Radford City ✓	✓	x	✓	x	x	x	x	x	x	x	x	x	2•	0.3251
Salem City ✓	✓	x	✓	x	x	✓	x	x	✓	x	x	x	4✓	0.3516
Spotsylvania County •	✓	x	✓	x	✓	✓	x	x	✓	x	x	x	5✓	0.3593
Stafford County •	✓	x	✓	x	x	x	x	✓	x	x	✓	x	4✓	0.3362
Virginia Beach City •	✓	x	✓	x	x	✓	x	✓	✓	✓	x	✓	7*	0.4060
West Point ✓	x	x	x	x	x	x	x	x	✓	x	x	x	1•	0.2667
Williamsburg-James City County*	x	x	x	x	x	x	x	x	x	x	x	x	0°	0.8000
Count	19	3	15	1	6	10	2	9	15	4	3	3		
Percent	83%	13%	65%	4%	26%	43%	9%	39%	65%	17%	13%	13%		
	Pay				Fee assistance			Cohort	Time	Other				

* all 3 high concentration models
✓ 2 high concentration models
• 1 high concentration model

* robust
✓ moderate
• weak
° none

Figure 6. Supports/Incentives Offered in High Concentration Divisions

Additional pay at the local level

Some form of pay is offered as an incentive in 19 of the 23 divisions with high concentrations of NBCTs. Supplements, stipends and awards for life of the certificate

were the most common form of financial incentive. Only three divisions offered step increases instead which, unlike stipends and supplements, translate into added value in benefits calculations. Loudoun County was the only division in this group that only offers a one-time bonus, and four divisions offered no additional pay beyond what candidates might receive from the state.

Fee assistance

Six divisions offered support in the full amount of the application fees. One of these six divisions, Falls Church City Public Schools, fostered strong support for NBPTS applicants through comprehensive fee assistance, paying the full fee for candidates on their first attempt, and $250 for a second attempt, communicating commitment to the candidates who go through the process. Only one other division, Manassas Park City Public Schools, offered support for application fees beyond the first attempt.

Collegial support

Nine of the 23 high concentration divisions organized either pre-candidacy and candidacy workshops or cohorts of applicants to provide collegial support to applicants engaging in the process. Some divisions have pooled their resources and built partnerships among themselves in concert with higher education institutions in their regions to provide coaching and guidance for candidates.

Release time

Fifteen of the 23 (65%) divisions provided from one to three days of professional leave for candidates to complete the rigors of the NBPTS process. One of these 15 divisions granted release time on a case-by-case basis.

Other forms of support

At least three divisions offered recertification points for candidates' efforts towards NBPTS credentialing, and at least four offered technical assistance with the recording of lessons for assessment exercises. At least one division paid the postage for the mailing of the candidates' assessment package; at least one division offered a professional development library of resources; and at least one division allowed the candidates an exemption from evaluation in the cycle in which National Board Certification is achieved. It should be noted that perhaps more divisions offered these miscellaneous supports, but not every division-level representative interviewed by Alday (2011) may have known about them nor might they have thought to list them as formal support offerings.

Variety in offerings of support

Both Alexandria and Virginia Beach City Public Schools stood out for offering at least one element of support in each of the categories of pay, fee assistance, cohort support, and release time. Arlington and Newport News City Public Schools as well as Chesterfield, Hanover, and Henrico County Public Schools offered at least one element of support in three of the four categories.

High concentration divisions that employed six or seven strategies were considered robust supporters of NBCTs including Alexandria, Arlington, and Falls Church City Public Schools, all with a LCI value of .8, as well as Hanover and Henrico County Public Schools and Manassas and Virginia Beach City Public schools with LCI values ranging from .3311 to .4370. Despite a very large number of NBCTs (346), Fairfax did not rank among the divisions with robust supports.

High concentration divisions that employed three to five strategies were considered moderate supporters of NBCTs including Chesterfield, Fairfax, Loudoun, Prince William, Spotsylvania, and Stafford County Public Schools and Hampton, Manassas Park, Newport News, and Salem City Public Schools, representing LCI values ranging from .2690 to .7126.

High concentration divisions that employed one or two strategies were considered weak supporters of NBCTs including West Point, Radford City, Franklin County and Botetourt County Public Schools. These four were among the smallest systems ranked in the top 10% for having high concentrations of NBCTs.

Finally, two of the divisions with high concentrations offered no supports for NBCTs: Williamsburg-James City County and Highland County Public Schools. Both divisions had very high LCI values, implying a strong ability to pay. Highland County had a small number of NBCTs, instructional personnel, and students, but Williamsburg-James City County is a fairly large division with over 10,000 students and nearly 900 teachers.

Table 8 summarizes the incentive categories, disaggregated by LCI segments. Low and middle LCI segments offered either weak or moderate incentives; middle to high LCI segments offered robust incentives. Surprisingly, both high concentration divisions offering non-existent incentives were in the highest LCI segment.

Table 8

Incentive Classification in High Concentration Divisions by LCI Segment

	Incentive category				
LCI segment	Non-existent (none)	Weak (1-2 strategies)	Moderate (3-5 strategies)	Robust (6-7 strategies)	
.1 - < .2					
.2 - < .3	0	1 (4.35%)	2 (8.70%)	0	
.3 - < .4	0	2 (8.70%)	5 (21.74%)	0	
.4 - < .5	0	1 (4.35%)	1 (4.35%)	4 (17.40%)	
.5 - < .6	0	0	1 (4.35%)	0	
.6 - < .7					
.7 - .8	2 (8.70%)	0	1 (4.35%)	3 (13.04%)	
Total (Percent)	2 (8.70%)	4 (17.40%)	10 (43.49%)	7 (30.44%)	23 (100%)

Note. No high-concentration divisions fell in the LCI segments left blank.

Question 3: What are the characteristics of the schools in which NBCTs serve with regards to the race/ethnicity and socioeconomic status (SES) of their student populations?

Description of school-level distribution

In the 2010-2011 school year, there were approximately 1,933 public schools in Virginia (VDOE, 2012a) compared to 1,932 NBCTs eligible for the state stipend. Ignoring geography, population concentrations, certification areas, and local incentive programs, there were theoretically enough NBCTs in Virginia for every school to employ one, giving every student the potential to receive instruction from a NBCT. However, only 865 (45% of the 1,933) schools in the Commonwealth employed one or more NBCTs in 2010-2011, leaving more than 55% of Virginia's schools without this resource.

Grade bands and school configurations

As Table 9 shows, in 2010-2011, nearly half of all NBCTs in Virginia taught elementary level students, less than 20% taught middle school students, and just over one third taught high school students. Approximately 96% (or 1,853) of the 1,932 NBCTs in Virginia were employed in traditional PK-12 classroom settings. A vast majority of NBCTs worked in traditionally configured schools defining elementary as kindergarten through fifth grade, middle school as serving grades six through eight, and high school as grades nine through 12.

Table 9

Virginia NBCT Employment by Grade Band and School Setting

Grade Bands	NBCTs in Traditional Settings (# and % within Level)	NBCTs in Non-Traditional Settings (# and % within Level)	Total NBCTs in Level
Elementary (PK-5)	881 (45.6%)	26 (1.3%)	907 (46.9%)
Elementary/Middle (PK-8 or 5-8)	10 (<1%)	5 (<1%)	15 (<1%)
Middle (6-8)	331 (17.1%)	9 (<1%)	340 (17.6%)
Middle/High (6-12 or 8-12)	0 (0%)	14 (<1%)	14 (<1%)
High (9 or 9-12)	631 (32.7%)	25 (1.3%)	656 (34.0%)
Total	1,853 (96%)	79 (4%)	1,932 (100%)

Four percent of NBCTs in Virginia worked in non-traditional school settings, such as magnet programs, alternative schools, vocational centers, public charters, model schools, application-only schools, and schools with less-common grade band (ex. Elementary/Middle and Middle/High). Some of these schools serve a constant population of students for a full day throughout the year, as is the case with charters,

model schools, immersion programs, and child development centers, and such schools were included in the subsequent analysis. However, other programs, such as those focusing on behavioral remediation, serve different students throughout the year as the result of placement changes and expiring disciplinary terms. Since enrollment tends to fluctuate greatly in this latter category, these schools were excluded from the analysis. Also excluded were programs that provided instruction for only part of the day, such as career and technical education at centers and community colleges, since students were still enrolled in their home or base school. Including such programs would mean double counting students, inflating the data.

After making the necessary exclusions of 20 schools and the 35 NBCTs they employed, 845 schools remained in the school-level analysis, as did the corresponding 1,897 NBCTs they employed. The grade band breakdown of schools included in the analysis is reported in Table 10.

Given the small number and percentage of NBCTs in elementary/middle and middle/high grade bands, the researcher collapsed the five grade bands into three segments as seen in Table 11, shifting elementary/middle to the broader category of elementary and shifting middle/high to the broader category of high. The middle school grade band remained unchanged. This decision facilitated more meaningful consideration of data since the two groups of elementary/middle and middle/high were too small to yield meaningful analysis.

Table 10

Virginia NBCTs by Grade Band

Grade Band	Number of Schools with NBCTs	Percentage of All Schools with NBCTs	Number of NBCTs	Percentage of All NBCTs
Elementary	499	59%	907	48%
Elementary/Middle	4	<1%	15	<1%
Middle	155	18%	340	18%
Middle/High	1	<1%	3	<1%
High	186	22%	632	33%
Total	845	100%	1,897	100%

Table 11

Virginia NBCTs by Condensed Grade Band

Grade bands	Number of Schools with NBCTs	Percentage of All Schools with NBCTs
Elementary (includes Elementary/Middle)	503	60%
Middle	155	18%
High (includes Middle/High)	187	22%
Total	845	100%

In examining the demographic variables of race/ethnicity and socioeconomic status, the researcher created segments with a range of 10 percentage points each, referred to as deciles, to categorize the ranging populations of Non-White and Free/Reduced Meal eligible students in all schools with NBCTs.

Race/ethnicity

To examine the distribution of all NBCTs relative to student race/ethnicity, the

researcher calculated percentages of Non-White students at the school level, collapsing all Non-White racial groups into one, including students who identified themselves as being of more-than-one race. One reason for this decision was that in some schools and divisions, racial/ethnic groups commonly referred to as “minorities” (Black, Hispanic, Asian) made up the majority of the student populations, causing the potential for confusion in the data. Additionally, research literature on equity identifies people of color as facing the greatest disadvantages in matters of educational access (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber, Perry, & Anthony, 2004; Humphrey, Koppich, & Hough, 2005; Koppich, Humphrey, & Hough, 2007; Lankford, Loeb, & Wyckoff, 2002; Noguera, 2008; Orfield & Eaton, 1996**;** Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007).

The researcher examined all 1,897 NBCTs in 845 schools. As Table 12 shows, the distribution of schools with NBCTs had a slight positive skew with larger numbers of schools with NBCTs serving small-to-moderate sized populations of Non-White students. The distribution of NBCTs and the average number of NBCTs per school across race deciles both appeared to be much more normally distributed.

Table 12

Distribution of NBCTs by Student Non-White Percentages

Total Non-White %	# and % Schools w/NBCTs	# and % NBCTs	Avg. No. NBCTs per School
0 - <10%	46 (5.44%)	73 (3.85%)	1.6
10 - <20%	103 (12.19%)	220 (11.60%)	2.1
20 - <30%	104 (12.19%)	242 (12.76%)	2.3
30 - <40%	125 (14.79%)	274 (14.44%)	2.2
40 - <50%	123 (14.56%)	286 (15.08%)	2.3
50 - <60%	66 (7.81%)	146 (7.70%)	2.2
60 - <70%	84 (9.94%)	201 (10.60%)	2.4
70 - <80%	75 (8.88%)	206 (10.86%)	2.7
80 - <90%	68 (8.05%)	166 (8.75%)	2.4
90 - <100%	51 (6.04%)	83 (4.38%)	1.6
State Totals/Avg.	845	1,897	2.2

The data were then disaggregated by grade band, and more interesting patterns emerged, as seen in Figure 7. The distribution of NBCTs teaching at the elementary level appeared more even across deciles, with highest percentages of schools with NBCTs still appearing in the moderate range (30-50% Non-White populations), mimicking the lines of a normal curve. The elementary grade band also had the highest values for percentages of schools with NBCTs among student populations with 70 – 100% Non-White students. Middle school levels also appeared to have a fairly normal distribution with a slight positive skew and highest values in the low-to-moderate range of 10-50% Non-White populations. The largest percentage of high schools with NBCTs had student Non-White populations between 40-50%, and a precipitous drop was observed between that decile and the next, with only about 6% of high schools with NBCTs having a student population of 50-60% Non-White. In fact, in all three grade bands, there was a sharp difference in the percentage of the schools that employed NBCTs when the student Non-White population increased from the 40-50% to the 50-

60% decile. In the two deciles with the highest percentage of Non-White students, elementary schools comprised the largest percentage of schools with NBCTs followed by middle schools, with high schools representing the smallest share. Only about 2% of high schools with NBCTs had Non-White student populations of 90-100%. In the first five deciles of Non-White populations up until the midpoint, a smaller percentage of schools with NBCTs were elementary, followed by middle, then high schools, and after the midpoint, the trend reversed, as a higher percentage of schools with NBCTs were elementary followed by middle, then high schools.

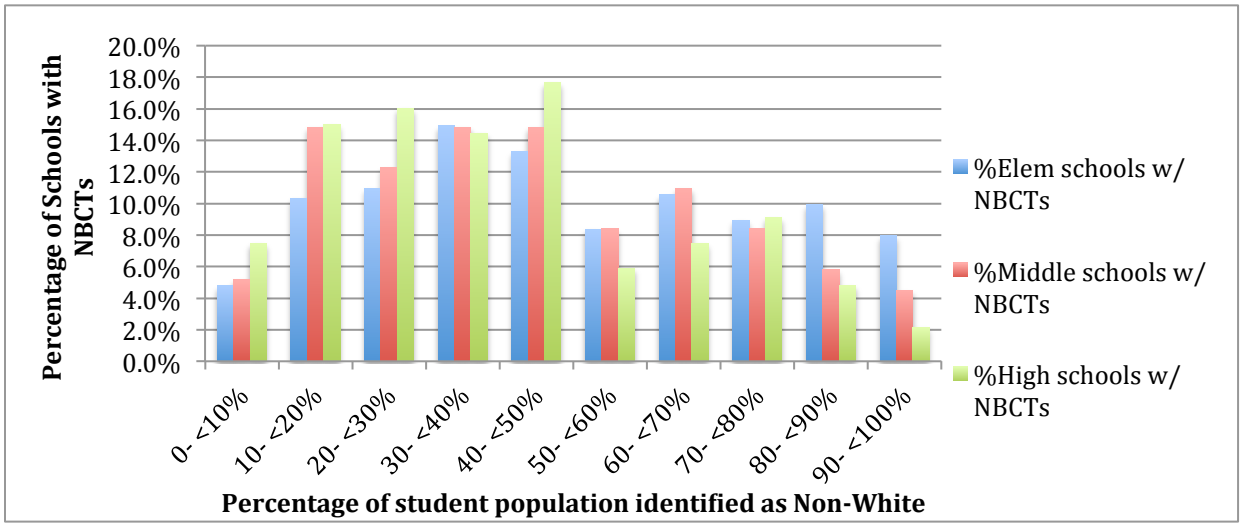

Figure 7. Percentage of Schools with NBCTs Relative to Non-White Population

With regards to the percentage of NBCTs employed in each grade band, similar trends emerged, as seen in Figure 8. The percentage of NBCTs teaching at the elementary level was again highest in schools with populations of 30-50% Non-White students. The percentage of NBCTs in the Middle school grade band was highest in schools with student Non-White populations of 10-20% and was lowest in the first and

last deciles consisting of very low and very high populations of Non-White students. The largest percentage of NBCTs teaching in the high school grade band worked in schools with student populations below 50%, and again NBCTs in all three grade bands experienced a sharp drop between the 40-50% and the 50-60% deciles. In the decile with the highest percentage of Non-White students, elementary NBCTs comprised the largest percentage of NBCTs followed by middle school NBCTs and lastly high schools representing the smallest percentage. High school NBCTs working in schools in the top decile constituted less than 1% of high school NBCTs. With the exception of two deciles (0 – <10% Non-White and 30 - < 40%), elementary NBCTs represented the smallest share of NBCTs working in schools with Non-White populations of less than 50%, and even then, the margins in those two deciles was very slim. Conversely, high school NBCTs represented the largest share of NBCTs working with the same populations, with the exception of the second decile where middle school teachers comprise the largest share. On the other end of the spectrum, in the highest decile, the percentage of NBCTs follows the same pattern as the percentage of schools employing them, with 7.2% of elementary NBCTs, 3.2% of middle NBCTs, and only 0.9% of high school level NBCTs working in schools with 90-100% Non-White

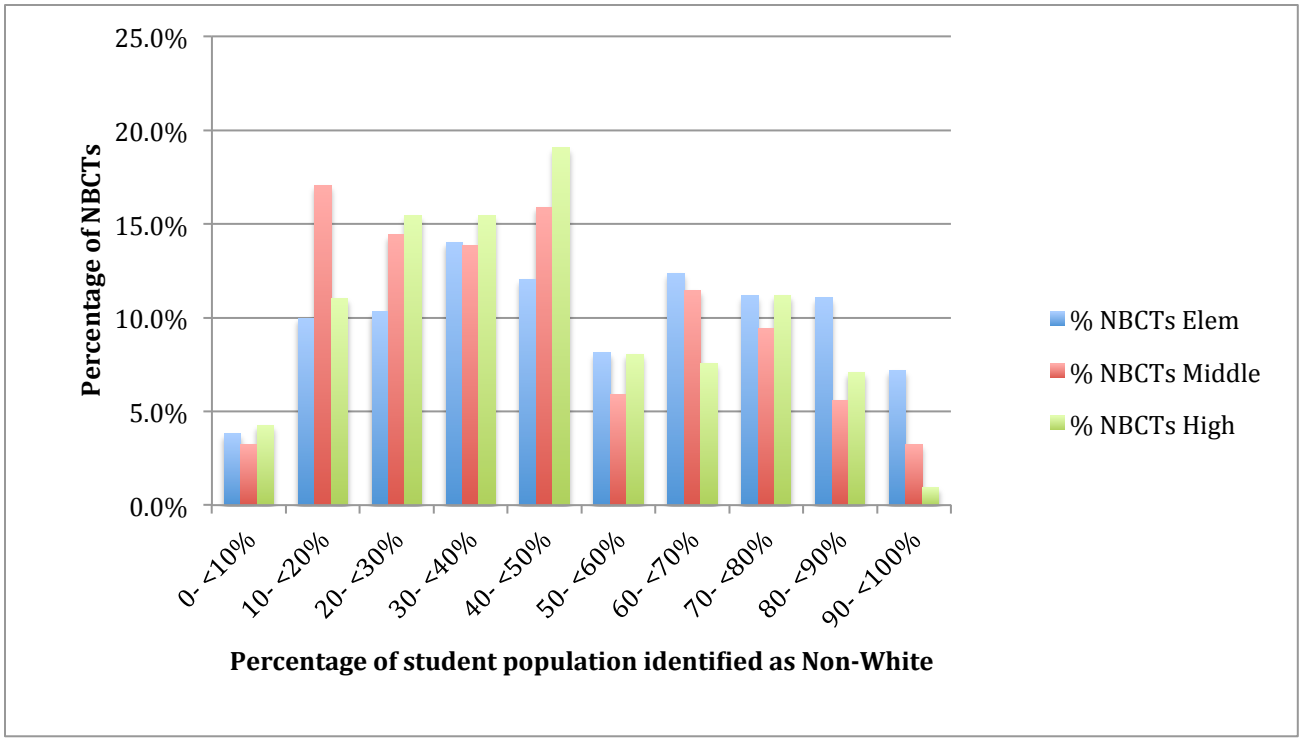

Figure 8. Percentage of NBCTs by Grade Band Relative to Non-White Populations

student populations.

Socioeconomic Status

As Table 13 shows, both the distributions of schools with NBCTs and the number of NBCTs have a very strong positive skew with regards to Free and Reduced Meal eligibility. Even the average number of NBCTs per school in each decile is positively skewed. All three measures indicated that a higher percentage of NBCTs work in schools with fewer Free/Reduced Lunch eligible students, or stated differently, they tended to work with more affluent student populations.

Table 13

Distribution of NBCTs by Free/Reduced Lunch Eligibility

Total Free/Reduced Lunch Eligible %	# and % Schools w/NBCTs	# and % NBCTs	Avg. NBCTs per School
0 - <10%	112 (13.25%)	241 (12.70%)	2.2
10 - <20%	135 (15.98%)	385 (20.30%)	2.9
20 - <30%	135 (15.98%)	300 (15.81%)	2.2
30 - <40%	109 (12.90%)	259 (13.65%)	2.4
40 - <50%	104 (12.31%)	227 (11.97%)	2.2
50 - <60%	98 (11.60%)	215 (11.33%)	2.2
60 - <70%	68 (8.10%)	127 (6.70%)	1.9
70 - <80%	46 (5.44%)	89 (4.69%)	1.9
80 - <90%	24 (2.84%)	33 (1.74%)	1.4
90 - <100%	14 (1.67%)	21 (1.11%)	1.5
State Totals/Avg.	845	1,897	2.2

Again, the data were then disaggregated by grade band, as shown in Figure 9, and more interesting patterns emerged. Each grade band was still positively skewed, but the distribution of high schools with NBCTs had the most dramatic slope, followed by middle schools and finally elementary schools. In the lowest decile (0-10% of students qualifying for Free or Reduced Meals), most schools were in the elementary grade band, followed by high schools, then middle schools, an exception from trends seen elsewhere in the data. From the 10 - <20% decile through the 40 - <50% decile, more elementary schools employed NBCTs that served this population relative to middle and high schools. In each decile from 50 - <60% to 90 – 100%, elementary schools made up a much larger percentage of schools serving these high poverty populations, followed by middle and high schools. In fact, only about 11% of high schools that employ NBCTs serve student populations with 60% or greater free and reduced meal eligibility. In looking at the top three deciles, no high schools that serve

student populations with 70-80% or 90-100% employ NBCTs, and 0.5% of high schools with NBCTs fall in the 80-90% range. Elementary schools with NBCTs comprise more of the schools in the most economically disadvantaged top five deciles by significant margins, especially compared to high schools. Again, middle schools with NBCTs fall somewhere in between.

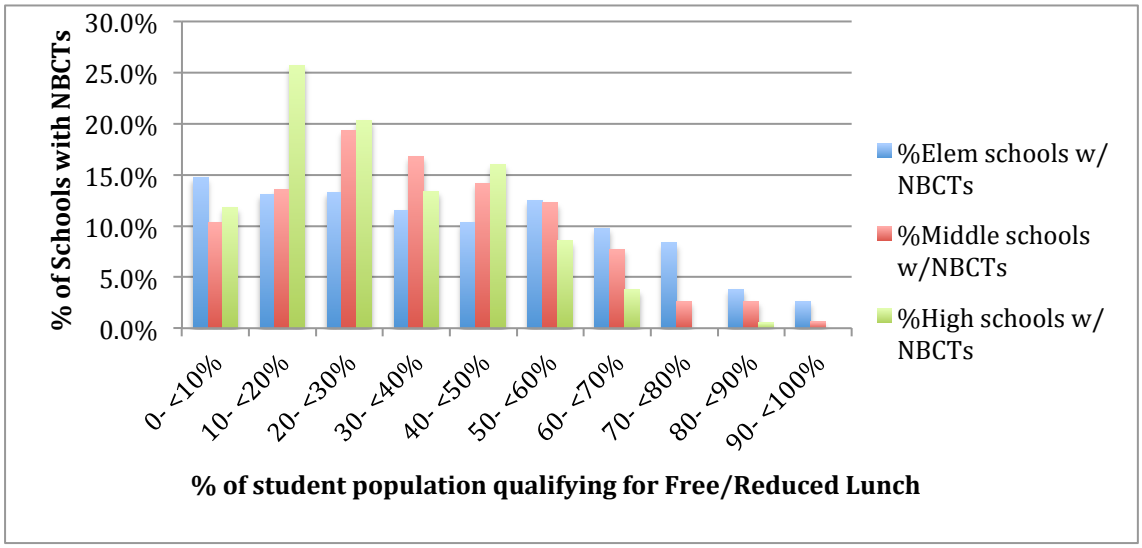

Figure 9. Percentage of Schools with NBCTs Relative to Free/Reduced Lunch Eligibility Populations

As Figure 10 shows, the percentage of elementary NBCTs remains fairly level across the first eight deciles with fluctuation of only about five percentage points. Slightly more variation appears for middle school NBCTs, but the greatest variation is seen in the percentage of high school NBCTs across deciles with over 42% of high school NBCTs working with student populations that fall in the first two deciles (0-20% Free and Reduced Meal eligibility). A sharp decline exists between the second and third deciles, where the percent of high school NBCTs serving students in these ranges dropped from over 31% to 17.6% respectively. Just as in the analysis of schools that

employ NBCTs, less than 1% of high school-level NBCTs teach in schools with economically disadvantaged student populations in the top three deciles (70-100%), with no NBCTs teaching in the 70-80% nor the 90-100% Free and Reduced Meal eligibility ranges.

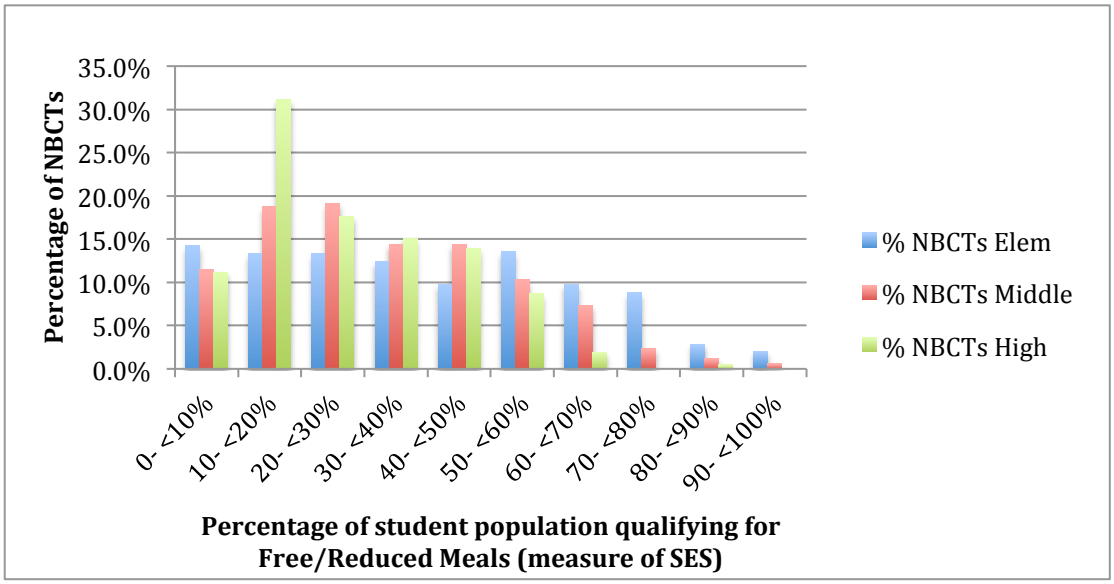

Figure 10. Percentage of NBCTs by Grade Band Relative to Free/Reduced Lunch Eligibility Populations

Utilizing Inferential Statistics: Correlation and Regression

To answer this third research question, descriptive statistics focused on the sample of 845 schools that employed at least one NBCT, however utilizing this restricted sample in interpreting inferential statistics had limits on validity. Using measures of student demography to predict the presence of NBCTs would be much more meaningful in the context of the broader population of all K-12 public schools in Virginia, since more than half of such schools did not employ any NBCTs. Analyses were conducted on both the sample and the population, but the focus will be on data

from the population.

The researcher first examined the relationship between two school-level demographic variables, socioeconomic status and race, and three measures of the presence of NBCTs in all 845 schools with at least one NBCT. It is important to remember that Non-White percentages include numerous races and ethnicities of students combined: Hispanic of any race, American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian/Pacific Islander, and Two or more races (Non-Hispanic). Correlations as well as simple and multiple regressions were calculated in an attempt to describe the strength, directionality and significance of relationships between the predictor variables of free and reduced meal eligibility and dependent values which measured the number of NBCTs in schools.

Table 14 summarizes the relationships between race, SES, and the number of NBCTs in schools within the sample of schools that employ NBCTs. The most critical piece of information is the strong positive relationship between the Non-White percentage and the SES percentage of student bodies in schools that employ one or more NBCT. The Pearson's r value of .616 is significant at the .000 level and demonstrates the connection between student race and student poverty in the sample with regards to the likelihood of NBCT employment. While socioeconomic status is also significantly correlated to the number of NBCTs employed in a school and student race appears not to be significant, the researcher cautions the reader not to generalize too strongly from this restricted sample as some conclusions may not be valid based on the inclusion of only a subset of schools. The correlations were only included to highlight the connection between race and poverty in the sample.

Table 14

Correlations in Schools that Employ NBCTs

		School Non-White Percentage	School SES Percentage	NBCT Count
School Non-White Percentage	Pearson Correlation	1	.616**	.044
	Sig. (2-tailed)		.000	.204
	Sum of Squares and Cross-products	559287.527	306975.349	1813.927
	Covariance	662.663	363.715	2.149
	N	845	845	845
School SES Percentage	Pearson Correlation	.616**	1	-.125**
	Sig. (2-tailed)	.000		.000
	Sum of Squares and Cross-products	306975.349	443333.217	-4606.781
	Covariance	363.715	525.276	-5.458
	N	845	845	845
NBCT Count	Pearson Correlation	.044	-.125**	1
	Sig. (2-tailed)	.204	.000	
	Sum of Squares and Cross-products	1813.927	-4606.781	3074.291
	Covariance	2.149	-5.458	3.643
	N	845	845	845

**Correlation is significant at $p < 0.01$.

Next the researcher examined the relationship between two school-level demographic variables, socioeconomic status and race, and the presence of NBCTs in all the broader population. All K-12 public schools were included if race and SES data were available, which excluded a small number of day treatment programs, alternative education centers, and vocational technology programs. The resulting n = 1,861 schools. Again, it is important to remember that Non-White percentages include

numerous races and ethnicities of students combined: Hispanic of any race, American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian/Pacific Islander, and Two or more races (Non-Hispanic). Correlations as well as simple and multiple regressions were calculated in an attempt to describe the strength, directionality and significance of relationships between the predictor variables of free and reduced meal eligibility and dependent values which measured the presence of NBCTs in schools.

Table 15 summarizes the correlations between variables in the population. First, let it be noted that school-level measures of free and reduced lunch eligibility, a measure of socioeconomic status, and the percentage of Non-White students were still positively correlated with a Pearson's correlation value of .461 and p = .000, suggesting a positive, albeit weaker relationship between student race and measures of poverty in the broader population compared to the sample of only schools that employ NBCTs. Second, both student socioeconomic status and race were each significantly correlated with the number of NBCTs in a school, but the direction of those two relationships differed. Student SES and NBCT count was negatively related (r = -.228), indicating that as the percentage of Free/Reduced Lunch eligible students increased in a school, the number of NBCTs employed in the school would decrease. Conversely as the percentage of Free/Reduced Lunch eligible students decreased in a school, the number of NBCTs employed in a school would increase. The relationship between the percentage of Non-White students and the number of NBCTs in a school, on the other hand, was positively related (r = .100), indicating that the values of Non-White percentages and the numbers of NBCTs were likely to rise together or fall together.

Table 15

Correlations in All Virginia Public Schools

		NBCT Count	School SES Percentage	School Non-White Percentage
NBCT Count	Pearson Correlation	1	-.228**	.100**
	Sig. (2-tailed)		.000	.000
	Sum of Squares and Cross-products	5401.379	-16450.063	8766.889
	Covariance	2.901	-8.835	4.713
	N	1,863	1,863	1,861
School SES Percentage	Pearson Correlation	-.228**	1	.461**
	Sig. (2-tailed)	.000		.000
	Sum of Squares and Cross-products	-16450.063	960713.689	538525.922
	Covariance	-8.835	515.958	289.530
	N	1863	1863	1861
School Non-White Percentage	Pearson Correlation	.100**	.461**	1
	Sig. (2-tailed)	.000	.000	
	Sum of Squares and Cross-products	8766.889	538525.922	1.421E6
	Covariance	4.713	289.530	763.856
	N	1,861	1,861	1,861

**Correlation is significant at $p < 0.01$.

As summarized in Table 16, each of the three regression analyses were significant at the .01 level. The two simple regressions and the one multiple regression utilizing the predictor variables of free and reduced meal eligibility and the percentage of

Non-White students were all able to significantly explain the variation in the number of NBCTs across Virginia's K-12 public schools.

Table 16

Regression Analyses Summary

	F	Sig	R	R squared
Free/Reduced Eligibility Percentage (SES)	102.386	.000*	.228	.052
Non-White Percentage (Race)	18.814	.000*	.100	.010
Both variables (SES and Race)	109.506	.000*	.325	.105

* significant at $p < 0.01$.

Equation for lines of best fit:

y = 1.440 + .016(Non-White%) - .026(Free/Reduced Lunch Eligibility%)

y = .752 + .006(Non-White%)

y = 1.751 - .017(Free/Reduced Lunch Eligibility%)

Explanation of the data

Throughout Chapter 4, data were presented to answer the three research questions posed in the study. This resulted in the creation of a baseline snapshot of the distribution of NBCTs across the Commonwealth. In synthesizing information from a variety of sources, several key findings emerged, which are each explored fully in Chapter 5.

Chapter 5 – Summary and Conclusions

Purpose of the study

By employing descriptive and predictive analyses, the researcher sought to explain the distribution of National Board Certified Teachers across the Commonwealth of Virginia relative to the incentive structures offered by divisions and the demographic characteristics of the student populations at the school level.

Summary of Findings

After analyzing quantitative data regarding the number of NBCTs relative to the number of instructional personnel, division LCI values, and school and division values for free/reduced meal eligibility and Non-White percentages, several themes emerged as major findings.

Finding 1: Inequality exists in the distribution of NBCTs across Virginia's public school divisions based on their ability to pay.

A small number of divisions possess a disproportionate share of NBCTs, as the 33 divisions (25% of Virginia's 132) that employ 10 or more NBCTs have over 90% of the Commonwealth's NBCTs. In examining the concentration of NBCTs at the division level, divisions possess anywhere between 0 to 17.91% of Virginia's total NBCTs. The concentration of NBCTs among all teaching personnel in a division ranges from 0 to 7.58%. Relative to student populations, the values stretch from 0 to .0084, meaning that the range goes from no NBCTs to 8.4 per thousand.

Of Virginia's 132 public school divisions, 101 (77%) employed at least 1 NBCT, leaving 31 (23%) divisions with none. The number of NBCTs in divisions varies greatly,

from 0 to 346. Not surprisingly, most divisions with no NBCTs were in the lowest three LCI segments (.1 - <.4), again pointing to inequality of access.

While a sizable number of NBCTs work in divisions with LCI values on the lower half of the index (723 are employed in divisions with values in the .1 - <.4 range), it is important to keep in mind that a much greater number (85) and proportion (64%) of Virginia divisions fall in this lower range of LCI values. There is still a disproportionate amount of NBCTs in divisions on the upper range of the LCI, as 1,209 NBCTs are employed in the 47 divisions with values in the .4 - <.8 range. This upper 36% of Virginia divisions employs 62% of the NBCTs. Divisions in the highest LCI segment of .7 - .8 have a significantly higher average NBCT figure than all other segments, with a value of 43.6 NBCTs per division, compared to the next highest value of 24.9 NBCTs per division in the .4 - <.5 segment. Divisions with high concentrations of NBCTs relative to the state total, relative to all teachers, and relative to student enrollment mostly fall in the moderate to high LCI range (<.3 - .8).

The negative binomial distribution, a model that best fit the data, yielded statistical significance for two covariates: first, student enrollment, which would control for the size of the school, and second, the division's LCI value, which approximated the division's ability to pay. Both covariates were statistically significant at the .000 level, indicating that the number of students and the LCI value could reasonably predict the number of NBCTs in a school division by explaining a significant portion of the variance in the dependent variable.

Gaps in teacher quality have been well-documented across multiple measures, and differences typically fall along the lines of student's racial and socioeconomic

demographics (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber, Perry, & Anthony, 2004; Humphrey, Koppich, & Hough, 2005; Koppich, Humphrey, & Hough, 2007; Lankford, Loeb, & Wyckoff, 2002; Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007). As a general trend, more-qualified teachers work with more affluent, non-minority students while less-qualified teachers work with poor, non-White students (Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Rotherham, 2004). As the data in Chapter 4 show, the supply of high quality teachers, in this case NBCTs, is not the primary problem as much as resource distribution, consistent with the findings of Darling-Hammond & Sykes (2004). Goldhaber, Perry and Anthony (2004) noted that in North Carolina, NBCTs tended to teach in mostly homogenously White communities with low rates of poverty, and it appears NBCTs in Virginia follow similar patterns, at least with regards to student socioeconomic status.

Finding 2: NBCTs are clustered in a relatively small percentage of schools, as opposed to being evenly distributed across and throughout divisions.

Given the number of K-12 public schools in 2010-2011 was 1,933 and only 865 of these schools employed one or more NBCT, it appears NBCTs are clustered in a few schools within divisions instead of being assigned uniformly. Approximately 45% of schools have at least one NBCT on staff, implying that a majority of Virginia's public schools, about 55%, are unable to support NBPTS candidates to the point of successful attainment of the credential, or are unsuccessful at recruiting and retaining NBCTs. To be fair, most divisions in Virginia employ a small number of NBCTs, so there might not

be an adequate number to be evenly placed in all schools throughout the division, but the data reveal trends regarding the types of schools in which NBCTs tend to teach. This will be examined in Findings 5, 6, and 7.

Assuming the presence of differences among schools within a division, one might expect schools to vary in attractiveness to potential teacher candidates. Since most districts pay on a uniform salary scale and incentives for NBCTs are applied generally, there is no additional incentive for NBCTs to take teaching assignments in less-attractive schools with more challenging working conditions (Koppich, Humphrey, & Hough, 2007). Researchers Goldhaber, Choi and Cramer (2004) created a measure of likelihood of student exposure to instruction by NBCTs and concluded that significantly higher proportions of students in high-achieving, affluent schools had exposure to NBCTs than those in low achieving, less affluent schools. Without inducing NBCTs to choose working in difficult schools, one might expect NBCTs to make logical employment favoring schools with better working conditions (Balter & Duncombe, 2008; Bracey & Molnar, 2003; Lankford, Loeb, & Wyckoff, 2002; Koppich, Humphrey, & Hough, 2007).

Finding 3: Divisions with high-concentrations of NBCTs tend to have moderate to robust support structures in place to nurture, recruit and retain these educators.

Using three different definitions and models of high-concentration, the researcher looked at 23 divisions in the Commonwealth that appeared in the top 10% of all divisions in one or more of the models. The most common support strategy, employed in 19 of the 23 high concentration divisions, was additional pay in some form, either as a

one-time bonus, a step increase, or a stipend for the life of the certificate. To assist with the steep cost of the assessment, 10 divisions offered partial fee coverage and six divisions offered full fee coverage or reimbursement. Given the modest salaries earned by teachers, the $2,500 assessment fee (NBPTS, 2012b) would likely be a significant obstacle to application for some.

Fourteen of the divisions identified as high-concentration granted at least one day of professional leave to candidates pursuing NBC and nine divisions provided formal encouragement to candidates through workshops, cohorts, or coursework in partnership with colleges or universities. This collegial support and release time from work responsibilities may also make a significant difference in encouraging teachers to pursue the rigorous NBPTS credentialing process.

In examining the strength of divisions' support structures, the seven high concentration divisions rated as robust all had LCI values of .4 - <.5 or .7 - .8, falling on the upper half of the LCI. This is unsurprising as divisions with stronger abilities to pay can likely afford the costs associated with providing a comprehensive support program to NBPTS candidates. Moderately strong support was provided in 10 of the 23 divisions, and most of these organizations fell in the lower to middle LCI segments, mirroring the strength of the support. The four divisions with weak support were all small divisions likely included in the list of top 23 high concentration divisions due to the sensitivity of two models to small values of student populations and NBCTs, so their presence in this subset of divisions may be overstated. Most surprising was the two divisions with no support structures for NBCTs, Highland County and Williamsburg-James City County, given that they both fell in the highest LCI segment of .7 - .8.

Highland County, like the other small divisions with NBCTs, may be considered high concentration due to hypersensitivity of two of the models, but Williamsburg-James City County (W-JCC) Public Schools is sizeable and is affluent. The presence of 39 NBCTs in W-JCC, just over 2% of Virginia's total NBCTs, cannot be explained by any support system, despite the division's strong ability to pay. Less surprising, but still interesting, was Fairfax County Public Schools' presence on the list of moderately supportive divisions, given the high number of NBCTs at 346. With 14% of the state's student population, Fairfax is the largest public school division in Virginia, so its employment of nearly 18% of Virginia NBCTs is noteworthy, but not excessively disproportionate. The high number of NBCTs alone warrants further investigation in Fairfax County Public Schools. Perhaps the culture of the division, or in the Northern Virginia region is one of high expectations for teachers, where applying for the NBPTS credential is pushed internally by the administration or externally through community politics.

Teachers' employment decisions are sensitive to salaries and financial incentives, competitive benefits offerings, and positive work conditions such as small class size, planning time, high-quality facilities, availability of instructional resources, and low-minority and low-poverty student body demographics (Balter & Duncombe, 2008; Bracey & Molnar, 2003; Lankford, Loeb, & Wykoff, 2002). The financial resources available to school divisions for recruiting top talent varies, and more challenging environments tend to pay less (Darling-Hammond & Sykes, 2004). Many divisions have high concentrations of NBCTs because they have reasonable ability to pay and can afford the support and/or recruitment and retention of NBCTs. According to Goldhaber, Choi, and Cramer (2004), a strong positive relationship exists between

the presence of NBCTs and the offering of incentives by school divisions. Kelley and Kimball (2001) found that additional pay for the credential increases interest in, understanding of, and appreciation for the National Board process, and Goldhaber, Perry, and Anthony (2004) indicated that the offering of local-level incentives beyond those offered by the state increases the application rates of teachers to NBPTS relative to divisions that do not offer local incentives. While achieving the NBPTS credential made teachers less likely to leave the divisions in which they were employed at the time of attainment, NBCTs who did move tended to move out of disadvantaged schools to situations with higher pay and more positive non-pecuniary work characteristics (Cavalluzzo, 2004; Goldhaber & Hansen, 2009).

Teachers also value support structures, formal and informal. Parker (2008) cited the presence of friends or mentors as a critical factor in employment decision-making. Goldhaber, Perry, and Anthony (2004) suggest teachers in more affluent, high-achieving districts are more likely to apply to and achieve successful certification through NBPTS, perhaps because of the positive work environments and a related sense of collegiality. One district in California, Los Angeles Unified School District, despite serving challenging student populations, boasted significant proportions of NBCTs which researchers Koppich, Humphrey, and Hough (2007) attributed to a district-wide bonus as well as two support programs that specifically recruit teachers already working in low-performing schools who wish to pursue certification and remain in their schools upon successful attainment.

Finding 4: State resources flow to areas with moderate-to-high ability to pay to subsidize National Board Certification.

Given the federal-level application assistance subsidies and the state-level blanket financial awards provided to NBCTs (National Board for Professional Teaching Standards Advocacy Link, 2008; VDOE, 2011c), the disproportionate distribution of NBCTs across the upper range of LCI values (.4 - <.8) by number (1,209 NBCTs) and percent (63%), one can conclude that state level resources flow mostly to divisions with a higher ability to pay. As with some consequences of any policy, this funneling of resources is likely unintentional, but it points to the inequitable distribution of resources in the absence of targeted incentives.

Early NBPTS leaders acknowledged the potential for the credential to exacerbate preexisting inequities (Carnegie Corporation, 1986) unless policies were crafted to address them. Goldhaber, Choi and Cramer (2004) noted that state-level resources flowed to more affluent districts and schools in North Carolina in an effort to promote and reward National Board Certification, further exacerbating the inequities that already existed between districts. They also asserted that many broad, blanket state-level incentive programs unintentionally undermine efforts to work towards a more equitable distribution of NBCTs as more resources are channeled to divisions that employ them, creating a subsidization of the credential for divisions that already have resources to support them (Goldhaber, Choi, & Cramer, 2004). While more resources might be ideal, one could argue the presence of resources is not the primary issue, as millions of dollars of support have already been provided from all levels of government and philanthropic organizations (Ballou, 2003). The data in this study of Virginia affirm

Goldhaber, Choi and Cramer's finding (2004) that teachers to follow broader patterns observed in the labor market, sorting into predictable work environments in the absence of targeted incentives for NBCTs to choose to work in high-need schools and divisions.

Finding 5: Student poverty at the school level, as measured by Free/Reduced Lunch eligibility, is negatively related to the presence of NBCTs.

First, the researcher examined schools that employed at least one NBCT, a subset of all schools in Virginia, to determine the types of school populations that had access to instruction by NBCTs. Descriptive analyses of the distributions showed that the schools in this subset served mostly small-to-moderate sized populations of Free/Reduced Lunch Eligible students. In examining this small-to-moderate range, defined as 0-60%, schools with Free/Reduced Lunch eligibility in this window represented about 82% of the sample.

By employing inferential statistics on the population of all K-12 public schools in Virginia, the researcher determined that student poverty was a greater predictor of the presence of NBCTs in a school than was student race, but both were significant at the .01 level. Race and poverty were also strongly correlated to each other. Student Free/Reduced Lunch eligibility was negatively related to the number of NBCTs in Virginia K-12 public schools.

Broader examination of literature suggests that student race impacts measures of teacher quality in a negative direction (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber, Perry, & Anthony, 2004; Humphrey, Koppich, & Hough, 2005; Koppich, Humphrey, & Hough,

2007; Lankford, Loeb, & Wyckoff, 2002; Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007). Goldhaber, Perry and Anthony's (2004) study of North Carolina yielded similar conclusions regarding the stronger likelihood of NBCTs to be employed in school communities with low rates of poverty, as did Humphrey, Koppich, and Hough's (2005) study of the six states with the highest number of NBCTs.

Finding 6: Student Non-White percentages at the school level are positively related to the presence of NBCTs.

Again, the researcher examined schools that employed at least one NBCT, a subset of all schools in Virginia, to determine the types of school populations that had access to instruction by NBCTs. Descriptive analyses of the distributions showed that the schools in this subset served mostly small-to-moderate sized populations of Non-White students, ranging from 0-60% Non-White students. Schools with Non-White populations of students in this window represented about 67% of the sample.

By employing inferential statistics on the population of all K-12 public schools in Virginia, the researcher determined that student poverty was a greater predictor of the presence of NBCTs in a school than was student race, but both were significant at the .01 level, and both variables were strongly correlated to each other. While student Free/Reduced Lunch eligibility was negatively related to the number of NBCTs in Virginia K-12 public schools, surprisingly student Non-White percentages were positively related to the presence of NBCTs.

Unlike the finding of this study, literature suggests that student race impacts teacher quality in a negative direction (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Goe,

Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber, Perry, & Anthony, 2004; Humphrey, Koppich, & Hough, 2005; Koppich, Humphrey, & Hough, 2007; Lankford, Loeb, & Wyckoff, 2002; Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007). While the researcher expected to find a negative relationship between student race and the presence of NBCTs, there are multiple interpretations that may explain the positive relationship between student race and the presence of NBCTs. First, the binary classification of race as White and Non-White, while justified, may oversimplify the issue. Also, some of the school divisions with high concentrations of NBCTs serve mostly Non-White students. This could be the result of effective grow-your-own programs or effective recruiting of previously successful NBCTs or the presence of a professional culture which values and encourages teachers to have the credential.

Finding 7: NBCTs working at the secondary level tend to be in schools characterized by low rates of poverty and low Non-White student populations.

Based on the analysis of the 845 K-12 public schools in Virginia, approximately 60% of schools with at least one NBCT were in the “elementary” grade band, 18% of schools with at least one NBCT were in the “middle” grade band, and 22% of schools with at least one NBCT were in the “high” grade band. Rankings among the three grade bands were similar with respect to the number and percentage of NBCTs across the Commonwealth, as approximately 48% of NBCTs worked in elementary schools, 19% worked in middle schools, and 33% worked in high schools.

When the subset of schools in which NBCTs worked was analyzed relative to student race and poverty, interesting patterns emerged. Schools with NBCTs that serve

mostly White, affluent students are disproportionately high schools, with middle schools ranking next and elementary schools ranking lowest. Conversely, schools that serve significant populations of Non-Whites and/or high percentages of Free/Reduced Lunch Eligibility are disproportionately elementary level, followed next by middle schools and finally high schools. In short, students' access to NBCTs appears to get worse as the grade bands progress.

In examining the curvature of the distributions of NBCTs based on student race and poverty, the slope is more flat with regards to student race and is more dramatic with regards to student socioeconomic status. This indicates again that poverty appears to matter more than race across all grade bands.

According to Joseph Aguerrebere, President and CEO of NBPTS, elementary teachers with National Board Certification outnumber secondary NBCTs on the national level (NBPTS, 2009). It appears as though Virginia mirrors national numbers across grade bands. The researcher was unable to locate support in literature regarding differential access to NBCTs across grade bands relative to student race and/or poverty.

Conclusions

In summary, data analysis confirmed differences in the presence of NBCTs based on divisions' abilities to pay, with the wealth of a locality contributing to a system's ability to support, recruit and retain them. In this sense, the general state-level award filtered funding to divisions that could already afford to direct resources to supporting National Board Certification. The presence of division-level incentives appeared frequently in divisions with high concentrations of NBCTs, but just like the

state award, they were offered in a general, not targeted, fashion. Within divisions, NBCTs appeared to be clustered together instead of evenly distributed, as they are employed in 45% of Virginia's schools. In examining all PK-12 public schools across Virginia, NBCTs were most likely to be found in schools with lower populations of Free/Reduced Lunch eligibility, as poverty and the number of NBCT in a school had a significant, negative relationship. Student race was also a statistically significant predictor variable, but the relationship was positive in nature, indicating that as Non-White populations of students increased, so did the number of NBCTs in a school. In the smaller sample of PK-12 schools that employed one or more NBCTs, however, race and poverty were very strongly and positively related, suggesting that demographics of the two groups either overlapped or covaried. Finally, disparities in the distribution of NBCTs by measures of student poverty were more dramatic at middle and high schools compared to elementary schools. In measures of student race at the secondary level, smaller proportions of NBCTs taught in schools with high proportions of Non-White students, whereas at the elementary level, NBCTs appeared with greater frequency in schools serving high percentages of Non-White students.

Implications for Practice

Based on the findings from this study, there are potential implications for policymakers and educational leaders at school, division, state, and national levels, for the NBPTS as an organization, and for leadership of teacher preparation programs.

- **United States Department of Education should consider providing grants to states based on plans that differentially allocate resources to address inequality.** In Virginia, the Candidate Subsidy Program enables NBPTS

candidates to apply for assistance with application fees (VDOE, 2011c) regardless of their teaching context. Title IIa federal grant funds, issued to divisions via VDOE under ESEA, can be leveraged to pay for many costs associated with supporting, recruiting, and retaining NBCTs (NBPTS, 2012a). These programs could be amended to provide fee assistance to teachers seeking certification in high-need schools, or new programs could be designed to encourage participation in NBPTS and home grow NBCTs already working in the trenches. Current funding streams could be restricted for this purpose, or new funding sources could be allocated.

- **The Virginia Department of Education and localities should explore changes in uses of resources currently devoted to the NBPTS credentialing process and to successful NBCTs.** Given shrinking resources relative to growing needs in K-12 education, policy makers might consider replacing broadly offered incentives with those that are targeted to benefit disadvantaged populations as a vehicle for school reform. Incentives for NBCTs could be tied to specific service requirements (Alday, 2011), such as offering remediation to at-risk students, providing professional development to other teachers regarding strategies to reach at-risk students, or awarding placement in challenging school environments with additional benefits such as stipends and extended contracts. This opportunity for NBCTs to exercise leadership while serving disadvantaged populations of students would lend elevated status to such positions, perhaps impacting the culture of education that rewards good teachers with easier teaching assignments (Koppich, Humphrey, & Hough, 2007). State funds might

also be used to offer grants to school divisions for assigning NBCTs to high-needs learners as well as offer grants to schools for employing NBCTs (Berry & Rasberry, 2007).

- **The Virginia Department of Education and localities should explore ways to increase the number of NBCTs working in high-need secondary schools.** Given that the inequality in the distribution of NBCTs is greater at the secondary level, efforts should be designed increase the number of NBCTs in high-need secondary schools through the offering of targeted incentives. These incentives could address the supply side of the equation, by home growing NBCTs and/or the demand side of the equation, by recruiting and retaining teachers to work in these environments.
- **The Virginia Department of Education and localities should consider revising incentive structures for NBCTs, especially with regards to high needs schools and divisions.** Since pay increases interest in and understanding of the NBPTS process (Kelly & Kimball, 2001), it appears that money matters to teachers (Lankford, Loeb, & Wyckoff, 2002). Schools, divisions, and states that do not currently offer incentives for NBCTs might consider allocating resources to do so. Schools, divisions and states that do have incentive programs in place for NBCTs should engage in an evaluation of the use of the funds to determine the impact on students across the spectrum, including Non-White and economically disadvantaged populations. Additional layers of stipends for teachers working in high need schools might also help bring greater balance to the distribution of NBCTs (Koppich, Humphrey, & Hough,

2007), as witnessed in the case of California (Humphrey, Koppich, & Hough, 2005). According to Alday (2011), only one Virginia school division offered a local incentive based on school assignment. Fairfax County offered a $1,750 award for NBCTs for teachers generally and an additional $1,750 for NBCTs who worked in high-risk schools, but this additional layer of incentive was discontinued in the 2009-2010 school year according to the NBCT program manager (P. Dimetres, personal communication, January 12, 2012).

- **The Virginia Department of Education and localities should combine multiple incentives to support teacher applicants to NBPTS and recruit, and retain NBCTs in high-need schools and divisions.** While salaries and incentive packages can be enticing and their appeal should not be ignored, it is unlikely that money alone will fix the problems associated with equity in distribution of NBCTs (Berry & Rasberry, 2007). Combining multiple layers of support and incentives may have greater impact on the problem. A summit of Ohio NBCTs generated recommendations for closing achievement gaps through modifications to recruitment and retention policies, which included tuition reimbursement, loan forgiveness and relocation expenses for NBCTs in exchange for years of service (Berry & Rasberry, 2007). Home growing NBPTS candidates among teachers already working in disadvantaged schools and divisions may increase their capacity and efficacy (Berry & King, 2005), elevate their professional status, serve as professional development, build a sense of camaraderie, and serve as a vehicle for school and division improvement (Berry & Rasberry, 2007; NBPTS, 2009). Establishing partnerships with universities to

form cohorts of supports in either face-to-face, online, or hybrid formats may assist teacher applicants in challenging schools to achieve despite a potential lack of support in their work environments (Goldhaber, Perry, & Anthony, 2004). Business and community partnerships might also be explored to offset the costs of NBPTS application. Finally, schools and divisions may wish to utilize a new initiative from NBPTS as a form of professional development, known as the "Take One" program. "Take One" allows teachers to engage in reflection and collaboration with colleagues to complete and submit one assessment component to NBPTS for scoring. The results of this assessment may be considered for graduate credit or may later be used towards National Board Certification, effectively giving teachers a chance to try out the credential process before committing to the full assessment process and related fees (NBPTS, 2012b).

- **The National Board for Professional Teaching Standards should elevate the craft of effectively teaching high-need students.** Rotherham (2004) suggested the possibility of NBPTS creating a certificate program for teachers with strengths working with target populations, which could serve as an avenue for sharing expertise and elevating the status of teaching challenging populations of students. Additionally, as a way to target achievement gaps, initiate positive school reform, and remove a barrier to the credential, Rotherham also suggested NBPTS might waive application fees for teachers seeking National Board Certification that work in challenging schools.

- **Division and school leadership should consider the assignment of teachers on the basis of their strengths and efficacy as a means of improving educational access.** Since NBCTs are not equally distributed throughout schools in divisions, it leaves the researcher to wonder if their assignment is haphazard or strategic. If strategic, what is the logic behind the decision-making? NBCTs should be utilized in classrooms, schools, and divisions in such a way as to improve access to quality education, especially populations of students who are traditionally underserved.
- **The Virginia Department of Education, localities, and teacher preparation programs should develop and implement research-based strategies focused on meeting the needs of at-risk student populations, especially students in poverty.** If NBCTs are effectively meeting the needs of at-risk student populations when assigned to schools that serve at-risk student populations, the VDOE, localities, and teacher preparation programs should incorporate training and support for all teachers that align with the NBPTS standards. Expanding exposure to such professional standards and aligning professional development to these competencies would theoretically benefit all students, including those most at-risk.

Suggestions for future studies

Research results in more questions, and numerous opportunities have emerged for future studies as a result of this baseline descriptive analysis of the distribution of NBCTs in Virginia.

- Look at the distribution of NBCTs in Virginia across multiple school years to determine if the distribution has remained consistent or has changed over time.
- Examine the moving patterns of NBCTs in Virginia, replicating a study conducted by Goldhaber and Hansen (2009) of North Carolina. Do they stay in the school where they achieve, transfer within the division, leave the division, leave the state, leave the teaching ranks for administration, or leave the profession altogether? If they do tend to move, what are the characteristics of the places to which they move? Once these patterns are understood, policymakers and leaders could target incentives accordingly.
- Analyze divisions with high concentrations of NBCTs and determine how equitably this resource is distributed throughout the schools. Do patterns of inequities emerge at the school level based on student race and poverty?
- Explore schools and divisions with high-concentrations of NBCTs through case studies to determine the impact of the credentialing process on the teachers and the organization. Also assess the impact of the supports and incentives offered by the division on teachers' overall interest in the process.
- Identify divisions with high concentration of NBCTs that also lack formal incentive and support packages to encourage participation in the NBPTS process. Determine what other factors encourage teachers to seek and successfully obtain certification.
- Explore the impact of divisions (such as Fairfax County, Virginia) and states (such as California) that formerly offered targeted incentives to NBCTs working in

high need schools. Determine if and to what extent the removal of such incentives has impacted equity.

- Investigate the distribution of NBCTs across Non-White racial groups at the classroom, school, and division levels to determine if some student groups are disproportionately impacted by the presence and absence of NBCTs.
- Examine the assignment of NBCTs at the school level. Are teachers clustered in high-need schools for maximum impact? Do they work with higher-achieving students with vocal parents who expect excellence? Within schools, are they assigned to magnet programs, upper-level courses, or cohorts of gifted students? Or are they working with high-need or at-risk students within schools?
- Explore secondary NBCTs' perceptions about working with challenging student populations. Why are they less likely to work in such environments? Understanding the perceptions may allow policymakers and school leaders to better target reforms.
- Conduct research on the correspondence between principles set forth by NBPTS and effective teaching practices. If there is a relationship, examine professional standards for teacher preparation programs and consider the need for alignment with NBPTS principles.

In summary, the researcher recommends further inquiry into measures of inequality in NBCT resource distribution over time; the assignment of NBCTs at the classroom, school and division levels; the impact of targeted incentives on such inequalities; the presence of NBCTs on schools and divisions in which they are employed; the role of support structures in encouraging participation in the NBPTS

process; the perceptions of NBCTs with regards to high need student populations; and the patterns of career movement of NBCTs over time.

Reflections

In the population of all K-12 public schools in Virginia as well as all K-12 public schools that employ NBCTs, race and poverty were strongly and significantly correlated ($r = .461$ and $r = .616$ respectively). Research on teacher quality, equity of access, and broader school characteristics points to the connection between racial and socioeconomic demographics of school communities (Berry & Darling-Hammond, 2006; Berry & Rasberry, 2007; Darling-Hammond, 1997; Darling-Hammond & Sykes, 2004; Goe, Parker, Carr, & Oxnam, 2009; Goldhaber, Choi, & Cramer, 2004; Goldhaber, Perry, & Anthony, 2004; Humphrey, Koppich, & Hough, 2005; Koppich, Humphrey, & Hough, 2007; Lankford, Loeb, & Wyckoff, 2002; Noguera, 2008; Orfield & Eaton, 1996; Parker, 2008; Rotherham, 2004; Tennessee Department of Education, 2007). By sheer count, White students comprise a larger number of students in poverty in Virginia's public schools, so Non-White race identification is not perfectly correlated to measures of poverty, however the number of Non-White students in poverty is disproportionately large, relative to the size of the Non-White population (VDOE, 2011b). This disproportionality is worthy of on-going research and efforts for reform.

A strong take-away lesson for me is that addressing poverty is critical to meaningful educational – and perhaps societal – reform. Achievement gaps are well-documented across multiple subgroups in student populations, but in this study, poverty appeared to have the strongest influence on the inequity in distribution of NBCTs. Any viable reform efforts must not ignore the impact of poverty on the whole child, one

aspect of which is educational access, quality, and opportunity. The problem is multi-faceted and complex, and it is too large for schools alone to fix. However, with the proper funding and support, schools and divisions are strategically positioned to positively influence the problem as part of a larger solution (Noguera, 2008) because of the great transformative power of education.

NBCTs, as well as teachers without the credential, appear to have strong perceptions, either real or imagined, of working with challenging student populations that impact their employment decisions. This appears to be especially true of teachers at the secondary level. As a side note, I recognize there are a greater number of elementary level NBCTs than secondary (NBPTS, 2009), but the distribution was disaggregated by grade band, examining percentages and proportions of NBCTs within each of those segments, thereby controlling for differences in raw numbers. The increasing inequality in the distribution of NBCTs across grade bands for disadvantaged populations is particularly troubling given that fewer students at the secondary level tend to apply for Free/Reduced meals (Burghardt, Gordon, Chapman, Gleason, & Fraker, 1993). Should more students apply for the assistance, NBCTs' willingness to work in schools with high poverty rates might decrease. On the other hand, this tendency of older students to underreport might make the gaps in access to NBCTs across grade bands more dramatic than they might be otherwise. The gaps might also be attributed to the types of individuals who are drawn to certain age groups of students. Perhaps elementary teachers possess higher levels of efficacy and believe more strongly in the transformative power of education, whereas secondary teachers may be disillusioned by the possibility of helping at-risk students. Perhaps a desire for prestige associated

with the NBPTS credential can be a way to counteract the perceived negative stigma of working in schools that serve more impoverished, Non-White communities. The professional culture of schools in different grade level bands might impact the willingness of teachers to pursue NBPTS certification in the first place, impacting the supply of NBCTs at the upper grade levels. These perceptions and the experiences that inform them must be addressed with resources to combat their negative impact.

Throughout the literature and in the context of my personal experiences, the best and the brightest teachers tend to work with students who are already likely to be academically successful, while students facing great challenges get what is left. If strong teachers work in less affluent divisions, then they may be at the best schools within those divisions. If they work in more challenged schools, then they may be working with gifted students in a magnet program. This deeply troubles me professionally, as I feel we as educators have a commitment to every child. This deeply troubles me morally, as I see equality in educational access as a civil right. And this deeply troubles me logically, as this is unhealthy for the economy and society as a whole (Childress, Doyle, & Thomas, 2009). Without working to meet the educational needs of the persistently underserved students and taking action on their behalf, America's economic competitiveness will be affected. Denying equal opportunity to anyone is wrong, and denying equal opportunity to growing masses is dangerous. Noguera (2008) references a metaphor of a canary in a mine, developed by Guinier and Torres (2003) to explain the plight of marginalized groups. They explain,

> Those who are racially marginalized are like the miner's canary: their distress is the first sign of danger that threatens us all. It is easy enough to think that when

> we sacrifice this canary, the only harm done is to communities of [marginalized groups]. Yet others ignore problems that converge around [marginalized groups] at their own peril, for these problems are symptoms warning us that we are all at risk (p.11).

It is my sincere hope that educators, policymakers, and citizens of a nation built on equal opportunity, begin deconstructing, reflecting and rebuilding current power structures in such a way that change comes swiftly. May we look back on such an era in our history with solemnness and vow to not repeat the wrongs committed against those that had no voice.

References

Alday, K. (2011). An historical analysis of the development of National Board Certification stipends in Virginia (Doctoral dissertation). Retrieved from http://lib.vt.edu/theses/available/etd-04042011-111339/

Ballou, D. (2003). Certifying accomplished teachers: A critical look at the National Board for Professional Teaching Standards. *Peabody Journal of Education, 78*(4), 201 - 219.

Balter, D., & Duncombe, W. (2008). Recruiting highly qualified teachers: Do district recruitment practices matter? *Public Finance Review, 36*(1), 33-62.

Berry, B., & Darling-Hammond, L. (2006). No Child Left Behind and the "Highly Qualified" teacher: The promise and the possibilities. Retrieved from http://www.eric.ed.gov.lib.vt.edu:8080/PDFS/ED498778.pdf

Berry, B. & King, T. (2005). Recruiting and retaining National Board Certified Teachers for hard-to-staff, low-performing schools: Silver bullets or smart solutions. Center for Teaching Quality. Retrieved from http://www.teachingquality.org/legacy/RecruitRetainHTSS.pdf

Berry, B. & Rasberry, M. (2007). Creating conditions for closing achievement gaps. Closing Achievement Gaps & Staffing High-Needs Schools: Recommendations from Ohio's National Board Certified Teachers, Center for Teaching Quality. Retrieved from http://www.teachingquality.org/legacy/OH_NBCT.pdf

Bond, L., Smith, T., Baker, W., & Hattie, J. (2000). *The certification system of the National Board for Professional Teaching Standards: A construct and*

consequential validity study. Greensboro, NC: Center for Educational Research and Evaluation.

Boyd, D., Lankford, H., Loeb, S., & Wyckoff, J. (2005). The draw of home: How teachers' preferences for proximity disadvantage urban schools. *Journal of Policy Analysis & Management, 24*(1), 113 - 132. doi: 10.1002/pam.20072

Bracey, G., & Molnar, A. (2003). Recruiting, preparing and retaining high quality teachers: An empirical synthesis. *Arizona State University Education Policy Research Unit.* http://nepc.colorado.edu/publication/recruiting-preparing-and-retaining-high-quality-teachers-an-empirical-synthesis

Burghardt, J., Gordon, A., Chapman, N., Gleason, P., & Fraker, T. (1993). *The school nutrition dietary assessment study: School food service, meals offered and dietary intakes.* Retrieved from http://www.fns.usda.gov/ora/menu/published/CNP/FILES/SNDA-FoodServ-Pt4.pdf

Carnegie Corporation. (1986). *A nation prepared: Teachers for the 21st Century. The report of the task force on teaching as a profession.*

Cavalluzzo, L. (2004). Is National Board Certification an effective signal of teacher quality? Retrieved June 22, 2010, from http://www.eric.ed.gov.ezproxy.lib.vt.edu:8080/PDFS/ED485515.pdf

Center for American Progress. (2008). Financial incentives for hard-to-staff positions: Cross-sector lessons for public education. Retrieved from http://www.americanprogress.org/issues/2008/11/pdf/hard_to_staff.pdf

Center on Education Policy. (2007). Answering the question that matters most: Has student achievement increased since No Child Left Behind? Retrieved from http://www.cep-dc.org/

Childress, S., Doyle, D., & Thomas, D. (2009). *Leading for equity: The pursuit of excellence in Montgomery County Public Schools.* Cambridge, MA: Harvard Education Press.

Darling-Hammond, L. (1997). *The right to learn: A blueprint for creating schools that work.* San Francisco: Jossey-Bass.

Darling-Hammond, L., & Sykes, G. (2004). *A teacher supply policy for education: How to meet the "Highly Qualified Teacher" challenge.* Noel Epstein (Ed.), *Who's in charge here? The tangled web of school governance and policy* (pp.164-227). Washington, D.C.: Brookings Institution Press.

Goe, L., Parker, C., Carr, D., & Oxnam, G. (2009, October). The equitable distribution of teachers: Strategies and results. In *America's opportunity: Teacher effectiveness and equity in K-12 classrooms* (Chapter 3). National Comprehensive Center for Teacher Quality. Retrieved from http://www.tqsource.org/publications/2009TQBiennial/2009BiennialReport.pdf

Goldhaber, D., Choi, H., & Cramer, L. (2004, June 3). A descriptive analysis of the distribution of NBPTS certified teachers in North Carolina. Center on Reinventing Public Education. Retrieved from http://www.cedr.us/papers/labor/2007-A%20Descriptive%20Analysis%20of%20Distribution.pdf

Goldhaber, D. (2008). Addressing the teacher qualification gap: Exploring the use and efficacy of incentives to reward teachers for tough assignments. Center on Reinventing Public Education. Retrieved from http://www.americanprogress.org/issues/2008/11/pdf/teacher_qualification_gap.pdf

Goldhaber, D. & Hansen, M. (2009). National Board Certification and teachers' career paths: Does NBPTS certification influence how long teachers remain in the profession and where they teach? *Education Finance and Policy 4*(3), 229-262. Retrieved from http://www.mitpressjournals.org/doi/abs/10.1162/edfp.2009.4.3.229

Goldhaber, D., Perry, D., & Anthony, E. (2004). The National Board for Professional Teaching Standards (NBPTS) process: Who applies and what factors are associated with NBPTS certification? *Educational Evaluation and Policy Analysis, 26*(4), 259-280. Retrieved from http://ezproxy.lib.vt.edu:8080/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ727527&site=ehost-live&scope=site

Guinier, L. & Torres, G. (2003). *The miner's canary: Enlisting race, resisting power, transforming democracy.* Cambridge: Harvard University Press.

Humphrey, D., Koppich, J., & Hough, H. (2005). Sharing the wealth: National Board Certified Teachers and the students who need them most. *Education Policy Analysis Archives, 13*(18), 3 - 48.

Institute for Research on Poverty. (2004). Has poverty changed over time? Retrieved from http://www.irp.wisc.edu/faqs/faq3.htm

Johnson, T., Bruce, M., Graham, P., Oliver, S., Oppong, N., Park, S., & Mansberger, D. (2005). Giving Tree Teachers: Women and the National Board Certification Process. *Feminist Teacher, 15*(3), 234 - 249.

Kelley, C., & Kimball, S. (2001). Financial incentives for National Board Certification. *Educational Policy, 15*(4), 547 - 574.

Koppich, J., Humphrey, D., & Hough, H. (2007). Making use of what teachers know and can do: Policy, practice, and National Board Certification. *Education Policy Analysis Archives*, 15(7), 1 – 28.

Lankford, H., Loeb, S., & Wyckoff, J. (2002). Teacher sorting and the plight of urban schools: A descriptive analysis. *Educational Evaluation and Policy Analysis, 24*(1), 37 - 62. doi: 10.3102/01623737024001037

Learning Point Associates. (2007). Implementing the No Child Left Behind Act: Teacher quality improves student achievement. Retrieved from http://www.learningpt.org/pdfs/qkey8.pdf

National Board for Professional Teaching Standards. (2002). *A 15 year retrospective: Raising the standard*. Retrieved from http://www.nbpts.org/about_us/mission_and_history/history

National Board for Professional Teaching Standards. (2010a). *Milestones*. Retrieved from http://www.nbpts.org/about_us/mission_and_history/milestones

National Board for Professional Teaching Standards. (2010b). *Mission and History*. Retrieved from http://www.nbpts.org/about_us/mission_and_history

National Board for Professional Teaching Standards. (2010c). *The Benefits*. Retrieved from http://nbpts.org/become_a_candidate/the_benefits

National Board for Professional Teaching Standards. (2011). Virginia state profile. Retrieved from http://www.nbpts.org/userfiles/File/Profiles/VA_State_Profile_2010_certday.pdf

National Board for Professional Teaching Standards. (2012a). Federal funding opportunities. Retrieved from http://www.nbpts.org/policy_center/legislation_federal_ini/federal_funding_opportun

National Board for Professional Teaching Standards. (2012b). *Fees and financial support*. Retrieved from http://www.nbpts.org/become_a_candidate/fees_financial_support

National Board for Professional Teaching Standards. (2012c). Take one. Retrieved from http://www.nbpts.org/products_and_services/take_one1

National Board for Professional Teaching Standards Advocacy Link (2008). Retrieved from http://www.nbpts.org

National Board for Professional Teaching Standards, National Board Certification as School Reform Forum. (2009). *Edited transcript retrieved from National Board Certification as School Reform Forum*. Retrieved from http://www.nbpts.org/about_us/national_board_certifica

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for school reform.* Retrieved from http://www2.ed.gov/pubs/NatAtRisk/index.html

National Forum on Education Statistics, Race/Ethnicity Data Implementation Task Force. (2008). *Managing an identity crisis: Forum guide to implementing new*

federal race and ethnicity categories. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://nces.ed.gov/pubs2008/2008802.pdf

National Teacher Certification Incentive Reward Program and Fund, Virginia General Assembly, §22.1-299.2 (1999). Retrieved from http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+22.1-299.2

No Child Left Behind Act of 2001, Pub. L. No. 107-110, 115 Stat. 1425 (2002). Retrieved from http://www.ed.gov/policy/elsec/leg/esea02/index.html

Noguera, P. (2003). *City schools and the American dream: Reclaiming the promise of public education.* New York: Teachers College Press.

Noguera, P. (2008). *The trouble with black boys: And other reflections on race, equity, and the future of public education.* San Francisco: Jossey-Bass.

Orfield, G. & Eaton, S. (1996). *Dismantling desegregation: The quiet reversal of Brown v. Board of Education.* New York: The New Press.

Parker, W. (2008, February). Desegregating teachers. Retrieved from http://works.bepress.com/wendy_parker/2

Rotherham, A. (2004). Opportunity and responsibility for National Board Certified Teachers (pp. 1-6). Washington, D.C.: Progressive Policy Institute.

Sanders, W., Ashton, J., & Wright, S. (2005, March). *Comparison of the effects of NPTS certified teachers with other teachers on the rate of student academic progress.* Report prepared for the National Board for Professional Teaching Standards. Retrieved July 21, 2011, from http://www.nbpts.org/resources/research/browse_studies?ID=15

Sanders, W. & Rivers, J. (1996). *Cumulative and residual effects of teachers on future student academic achievement.* Knoxville: University of Tennessee Value-Added Research and Assessment Center. Retrieved from http://www.mccsc.edu/~curriculum/cumulative%20and%20residual%20effects%20of%20teachers.pdf

Southeast Center for Teaching Quality. (2004). Recruiting quality teachers to hard-to-staff schools. Retrieved from http://www.teachingquality.org/pdfs/HuntHardtoStaff.pdf

Tennessee Department of Education. (2007). Tennessee's most effective teachers: Are they assigned to the schools that need them most? Retrieved from http://www.tn.gov/education/nclb/doc/TeacherEffectiveness2007_03.pdf

U.S. Department of Agriculture. (2011). *National School Lunch Program*. Retrieved from http://www.fns.usda.gov/cnd/lunch/

U.S. Department of Education (2003, August 23*). Fact sheet on the major provisions of the conference report to H.R. 1, the No Child Left Behind Act.* Retrieved from http://www2.ed.gov/nclb/overview/intro/factsheet.html

U.S. Department of Education. (2010). *A blueprint for reform: The reauthorization of the Elementary and Secondary Education Act*. Retrieved from http://www2.ed.gov/policy/elsec/leg/blueprint/blueprint.pdf

Virginia Department of Education. (2006). Virginia requirements for teachers not new to the teaching profession to meet the definition of highly qualified in the federal core academic areas and special education. Attachment A to Informational Supts. Memo No. 43. Retrieved from

http://www.doe.virginia.gov/teaching/licensure/va_requirements_teachers_not-new.pdf

Virginia Department of Education. (2011a). Composite Index of local ability to pay. Retrieved from http://www.doe.virginia.gov/school_finance/budget/compositeindex_local_abilitypay/index.shtml

Virginia Department of Education. (2011b). Fall membership. Retrieved from http://www.doe.virginia.gov/statistics_reports/enrollment/fall_membership/index.shtml

Virginia Department of Education. (2011c). National Board Certification incentive awards. Retrieved from http://www.doe.virginia.gov/teaching/career_resources/national_board_cert/index.shtml

Virginia Department of Education. (2012a). Fall enrollment [Data file]. Retrieved from http://www.doe.virginia.gov/statistics_reports/enrollment/fall_membership/index.shtml

Virginia Department of Education. (2012b). National school lunch free and reduced price eligibility report [Data file]. Retrieved from http://www.doe.virginia.gov/support/nutrition/statistics/index.shtml

Virginia Education Association. (2010). Virginia's educational disparities FY 2008-2009. Retrieved from http://www.veanea.org/assets/document/disparity-2010-07b.pdf

Virginia Educational Excellence Incentive Reward Program and Fund, H.B. 2710, Virginia General Assembly. (1999). Retrieved from http://leg1.state.va.us/cgi-bin/legp504.exe?991+ful+HB2710

Weinberg, M. (1967). *Race and place: A legal history of the neighborhood school*. Retrieved from http://www.eric.ed.gov:80/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED023751&ERICExtSearch_SearchType_0=no&accno=ED023751

Appendix A

VirginiaTech

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24060
540/231-4606 Fax 540/231-0959
e-mail irb@vt.edu
Website: www.irb.vt.edu

MEMORANDUM

DATE: October 18, 2011

TO: Carol Cash, Laura Kassner

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: The Distribution of National Board Certified Teachers in Virginia

IRB NUMBER: 11-904

Effective October 17, 2011, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: **Exempt, under 45 CFR 46.101(b) category(ies) 4**
Protocol Approval Date: **10/17/2011**
Protocol Expiration Date: **NA**
Continuing Review Due Date*: **NA**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Appendix B

Div. #	Division	Final 2010-2012 Composite Index	Div. #	Division	Final 2010-2012 Composite Index
001	ACCOMACK	.3753	070	PATRICK	.2439
002	ALBEMARLE	.6872	071	PITTSYLVANIA	.2401
003	ALLEGHANY	.2151	072	POWHATAN	.3969
004	AMELIA	.3472	073	PRINCE EDWARD	.3043
005	AMHERST	.2664	074	PRINCE GEORGE	.2344
006	APPOMATTOX	.2732	075	PRINCE WILLIAM	.4036
007	ARLINGTON	.8000	077	PULASKI	.2870
008	AUGUSTA	.3416	078	RAPPAHANNOCK	.8000
009	BATH	.8000	079	RICHMOND COUNTY	.3562
010	BEDFORD COUNTY	.4076	080	ROANOKE COUNTY	.3460
011	BLAND	.2723	081	ROCKBRIDGE	.5050
012	BOTETOURT	.3682	082	ROCKINGHAM	.3489
013	BRUNSWICK	.2728	083	RUSSELL	.2113
014	BUCHANAN	.2849	084	SCOTT	.1821
015	BUCKINGHAM	.2738	085	SHENANDOAH	.4029
016	CAMPBELL	.2490	086	SMYTH	.2100
017	CAROLINE	.3580	087	SOUTHAMPTON	.2896
018	CARROLL	.2573	088	SPOTSYLVANIA	.3593
019	CHARLES CITY	.4203	089	STAFFORD	.3362
020	CHARLOTTE	.2288	090	SURRY	.6955
021	CHESTERFIELD	.3551	091	SUSSEX	.3213
022	CLARKE	.5346	092	TAZEWELL	.2487
023	CRAIG	.2903	093	WARREN	.4204
024	CULPEPER	.4167	094	WASHINGTON	.3165
025	CUMBERLAND	.2805	095	WESTMORELAND	.5020
026	DICKENSON	.1940	096	WISE	.1885
027	DINWIDDIE	.2631	097	WYTHE	.3142
028	ESSEX	.4868	098	YORK	.3727
029	FAIRFAX COUNTY	.7126	101	ALEXANDRIA	.8000
030	FAUQUIER	.6097	102	BRISTOL	.3132
031	FLOYD	.3470	103	BUENA VISTA	.1932
032	FLUVANNA	.3867	104	CHARLOTTESVILLE	.6560
033	FRANKLIN COUNTY	.4011	106	COLONIAL HEIGHTS	.4428
034	FREDERICK	.3816	107	COVINGTON	.2597
035	GILES	.2649	108	DANVILLE	.2470
036	GLOUCESTER	.3703	109	FALLS CHURCH	.8000
037	GOOCHLAND	.8000	110	FREDERICKSBURG	.7763

Appendix B continues

Appendix B continued

Div. #	Division	Final 2010-2012 Composite Index	Div. #	Division	Final 2010-2012 Composite Index
038	GRAYSON	.3178	111	GALAX	.2695
039	GREENE	.3500	112	HAMPTON	.2690
040	GREENSVILLE	.1998	113	HARRISONBURG	.4133
041	HALIFAX	.2748	114	HOPEWELL	.2285
042	HANOVER	.4195	115	LYNCHBURG	.3643
043	HENRICO	.4370	116	MARTINSVILLE	.2263
044	HENRY	.2315	117	NEWPORT NEWS	.2778
045	HIGHLAND	.7846	118	NORFOLK	.3004
046	ISLE OF WIGHT	.3926	119	NORTON	.3042
048	KING GEORGE	.3875	120	PETERSBURG	.2255
049	KING AND QUEEN	.4404	121	PORTSMOUTH	.2497
050	KING WILLIAM	.3291	122	RADFORD	.3251
051	LANCASTER	.8000	123	RICHMOND CITY	.4945
052	LEE	.1692	124	ROANOKE CITY	.3582
053	LOUDOUN	.5854	126	STAUNTON	.4024
054	LOUISA	.5392	127	SUFFOLK	.3432
055	LUNENBURG	.2308	128	VIRGINIA BEACH	.4060
056	MADISON	.5204	130	WAYNESBORO	.3609
057	MATHEWS	.5882	131	WILLIAMSBURG	.8000
058	MECKLENBURG	.3315	132	WINCHESTER	.5124
059	MIDDLESEX	.7430	135	FRANKLIN CITY	.3047
060	MONTGOMERY	.3549	136	CHESAPEAKE	.3465
062	NELSON	.5734	137	LEXINGTON	.4601
063	NEW KENT	.4312	139	SALEM	.3516
065	NORTHAMPTON	.5109	142	POQUOSON	.3524
066	NORTHUMBERLAND	.8000	143	MANASSAS	.4005
067	NOTTOWAY	.2547	144	MANASSAS PARK	.3311
068	ORANGE	.4257	202	COLONIAL BEACH	.3785
069	PAGE	.3181	207	WEST POINT	.2667

Virginia Department of Education. (2011a). Composite Index of local ability to pay. Retrieved from http://www.doe.virginia.gov/school_finance/budget/compositeindex_local_abilitypay/index.shtml

Appendix C

Summary of Division Level Data

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	NBCT Concentration Relative to # Students	# Instructional Personnel	% of Total Instructional Personnel in VA	NBCT Concentration Relative to Instructional Personnel	Diff. between Student % and NBCT%
001	ACCOMACK	.3753	0	0.00%	5,088	0.41%	0	419	0.00000	0.00%	-0.406%
002	ALBEMARLE	.6872	15	0.78%	13,212	1.06%	0.001135332	1,116	0.01344	1.34%	-0.279%
003	ALLEGHANY	.2151	4	0.21%	2,804	0.22%	0.001426534	228	0.01754	1.75%	-0.017%
004	AMELIA	.3472	1	0.05%	1,815	0.14%	0.000550964	127	0.00787	0.79%	-0.093%
005	AMHERST	.2664	4	0.21%	4,599	0.37%	0.000869754	429	0.00932	0.93%	-0.160%
006	APPOMATTOX	.2732	1	0.05%	2,300	0.18%	0.000434783	181	0.00552	0.55%	-0.132%
007	ARLINGTON	.8000	123	6.37%	21,485	1.72%	0.005724924	1,696	0.07252	7.25%	4.650%
008	AUGUSTA	.3416	2	0.10%	10,769	0.86%	0.000185718	864	0.00231	0.23%	-0.757%
009	BATH	.8000	0	0.00%	658	0.05%	0	69	0.00000	0.00%	-0.053%
010	BEDFORD COUNTY	.4076	9	0.47%	10,592	0.85%	0.000849698	830	0.01084	1.08%	-0.380%
011	BLAND	.2723	1	0.05%	897	0.07%	0.001114827	83	0.01205	1.20%	-0.020%
012	BOTETOURT	.3682	15	0.78%	5,009	0.40%	0.00299461	403	0.03722	3.72%	0.376%
013	BRUNSWICK	.2728	0	0.00%	2,097	0.17%	0	179	0.00000	0.00%	-0.167%
014	BUCHANAN	.2849	1	0.05%	3,333	0.27%	0.00030003	287	0.00348	0.35%	-0.214%
015	BUCKINGHAM	.2738	0	0.00%	2,035	0.16%	0	169	0.00000	0.00%	-0.163%
016	CAMPBELL	.2490	1	0.05%	8,528	0.68%	0.000117261	628	0.00159	0.16%	-0.629%
017	CAROLINE	.3580	1	0.05%	4,257	0.34%	0.000234907	300	0.00333	0.33%	-0.288%
018	CARROLL	.2573	0	0.00%	4,471	0.36%	0	377	0.00000	0.00%	-0.357%
019	CHARLES CITY	.4203	0	0.00%	844	0.07%	0	79	0.00000	0.00%	-0.067%
020	CHARLOTTE	.2288	4	0.21%	2,125	0.17%	0.001882353	160	0.02500	2.50%	0.037%
021	CHESTERFIELD	.3551	88	4.55%	59,243	4.73%	0.001485408	4,123	0.02134	2.13%	-0.177%
022	CLARKE	.5346	1	0.05%	2,082	0.17%	0.000480307	157	0.00637	0.64%	-0.115%

Appendix C continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	NBCT Concentration Relative to # Students	# Instructional Personnel	% of Total Instructional Personnel in VA	NBCT Concentration Relative to Instructional Personnel	Diff. between Student % and NBCT%
023	CRAIG	.2903	0	0.00%	718	0.06%	0	65	0.00000	0.00%	-0.057%
024	CULPEPER	.4167	8	0.41%	7,710	0.62%	0.001037613	580	0.01379	1.38%	-0.202%
025	CUMBERLAND	.2805	1	0.05%	1,503	0.12%	0.000665336	116	0.00862	0.86%	-0.068%
026	DICKENSON	.1940	0	0.00%	2,521	0.20%	0	227	0.00000	0.00%	-0.201%
027	DINWIDDIE	.2631	1	0.05%	4,570	0.37%	0.000218818	349	0.00287	0.29%	-0.313%
028	ESSEX	.4868	1	0.05%	1,634	0.13%	0.000611995	131	0.00763	0.76%	-0.079%
029	FAIRFAX COUNTY	.7126	346	17.91%	174,479	13.94%	0.001983047	14,272	0.02424	2.42%	3.972%
030	FAUQUIER	.6097	23	1.19%	11,286	0.90%	0.002037923	972	0.02366	2.37%	0.289%
031	FLOYD	.3470	2	0.10%	2,071	0.17%	0.000965717	170	0.01176	1.18%	-0.062%
032	FLUVANNA	.3867	5	0.26%	3,773	0.30%	0.001325205	309	0.01618	1.62%	-0.043%
033	FRANKLIN COUNTY	.4011	21	1.09%	7,408	0.59%	0.002834773	625	0.03360	3.36%	0.495%
034	FREDERICK	.3816	16	0.83%	13,143	1.05%	0.001217378	1,016	0.01575	1.57%	-0.222%
035	GILES	.2649	0	0.00%	2,507	0.20%	0	209	0.00000	0.00%	-0.200%
036	GLOUCESTER	.3703	11	0.57%	6,015	0.48%	0.001828761	459	0.02397	2.40%	0.089%
037	GOOCHLAND	.8000	1	0.05%	2,481	0.20%	0.000403063	205	0.00488	0.49%	-0.146%
038	GRAYSON	.3178	5	0.26%	1,950	0.16%	0.002564103	182	0.02747	2.75%	0.103%
039	GREENE	.3500	5	0.26%	2,882	0.23%	0.001734906	255	0.01961	1.96%	0.029%
040	GREENSVILLE	.1998	0	0.00%	2,669	0.21%	0	216	0.00000	0.00%	-0.213%
041	HALIFAX	.2748	1	0.05%	5,910	0.47%	0.000169205	494	0.00202	0.20%	-0.420%
042	HANOVER	.4195	63	3.26%	18,628	1.49%	0.003382006	1,493	0.04220	4.22%	1.773%
043	HENRICO	.4370	86	4.45%	49,405	3.95%	0.001740715	3,671	0.02343	2.34%	0.505%
044	HENRY	.2315	2	0.10%	7,491	0.60%	0.000266987	557	0.00359	0.36%	-0.495%
045	HIGHLAND	.7846	2	0.10%	238	0.02%	0.008403361	34	0.05882	5.88%	0.085%
046	ISLE OF WIGHT	.3926	10	0.52%	5,515	0.44%	0.001813237	407	0.02457	2.46%	0.077%
048	KING GEORGE	.3875	4	0.21%	4,223	0.34%	0.000947194	299	0.01338	1.34%	-0.130%

Appendix C continues

Appendix C continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	NBCT Concentration Relative to # Students	# Instructional Personnel	% of Total Instructional Personnel in VA	NBCT Concentration Relative to Instructional Personnel	Diff. between Student % and NBCT%
050	KING WILLIAM	.3291	0	0.00%	2,239	0.18%	0	173	0.00000	0.00%	-0.179%
051	LANCASTER	.8000	4	0.21%	1,321	0.11%	0.003028009	116	0.03448	3.45%	0.102%
052	LEE	.1692	0	0.00%	3,597	0.29%	0	369	0.00000	0.00%	-0.287%
053	LOUDOUN	.5854	90	4.66%	63,142	5.04%	0.001425359	4,858	0.01853	1.85%	-0.385%
054	LOUISA	.5392	2	0.10%	4,731	0.38%	0.000422744	382	0.00524	0.52%	-0.274%
055	LUNENBURG	.2308	0	0.00%	1,653	0.13%	0	137	0.00000	0.00%	-0.132%
056	MADISON	.5204	1	0.05%	1,849	0.15%	0.000540833	154	0.00649	0.65%	-0.096%
057	MATHEWS	.5882	0	0.00%	1,212	0.10%	0	107	0.00000	0.00%	-0.097%
058	MECKLENBURG	.3315	0	0.00%	4,816	0.38%	0	428	0.00000	0.00%	-0.385%
059	MIDDLESEX	.7430	1	0.05%	1,191	0.10%	0.000839631	115	0.00870	0.87%	-0.043%
060	MONTGOMERY	.3549	27	1.40%	9,553	0.76%	0.002826337	862	0.03132	3.13%	0.634%
062	NELSON	.5734	0	0.00%	1,966	0.16%	0	169	0.00000	0.00%	-0.157%
063	NEW KENT	.4312	1	0.05%	2,888	0.23%	0.00034626	216	0.00463	0.46%	-0.179%
065	NORTHAMPTON	.5109	1	0.05%	1,800	0.14%	0.000555556	170	0.00588	0.59%	-0.092%
066	NORTHUMBERLAND	.8000	0	0.00%	1,474	0.12%	0	114	0.00000	0.00%	-0.118%
067	NOTTOWAY	.2547	1	0.05%	2,347	0.19%	0.000426076	175	0.00571	0.57%	-0.136%
068	ORANGE	.4257	1	0.05%	5,237	0.42%	0.000190949	360	0.00278	0.28%	-0.367%
069	PAGE	.3181	0	0.00%	3,697	0.30%	0	303	0.00000	0.00%	-0.295%
070	PATRICK	.2439	1	0.05%	2,581	0.21%	0.000387447	211	0.00474	0.47%	-0.154%
071	PITTSYLVANIA	.2401	2	0.10%	9,258	0.74%	0.000216029	743	0.00269	0.27%	-0.636%
072	POWHATAN	.3969	2	0.10%	4,476	0.36%	0.000446828	356	0.00562	0.56%	-0.254%
073	PRINCE EDWARD	.3043	0	0.00%	2,551	0.20%	0	222	0.00000	0.00%	-0.204%
074	PRINCE GEORGE	.2344	4	0.21%	6,357	0.51%	0.000629228	479	0.00835	0.84%	-0.301%
075	PRINCE WILLIAM	.4036	129	6.68%	79,358	6.34%	0.001625545	5,267	0.02449	2.45%	0.338%
077	PULASKI	.2870	4	0.21%	4,685	0.37%	0.000853789	384	0.01042	1.04%	-0.167%

Appendix C continues

Appendix C continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	NBCT Concentration Relative to # Students	# Instructional Personnel	% of Total Instructional Personnel in VA	NBCT Concentration Relative to Instructional Personnel	Diff. between Student % and NBCT%
078	RAPPAHANNOCK	.8000	0	0.00%	928	0.07%	0	81	0.00000	0.00%	-0.074%
079	RICHMOND COUNTY	.3562	0	0.00%	1,214	0.10%	0	97	0.00000	0.00%	-0.097%
080	ROANOKE COUNTY	.3460	14	0.72%	14,622	1.17%	0.000957461	1,175	0.01191	1.19%	-0.443%
081	ROCKBRIDGE	.5050	0	0.00%	2,798	0.22%	0	258	0.00000	0.00%	-0.223%
082	ROCKINGHAM	.3489	15	0.78%	11,921	0.95%	0.001258284	937	0.01601	1.60%	-0.176%
083	RUSSELL	.2113	1	0.05%	4,333	0.35%	0.000230787	334	0.00299	0.30%	-0.294%
084	SCOTT	.1821	0	0.00%	3,970	0.32%	0	327	0.00000	0.00%	-0.317%
085	SHENANDOAH	.4029	5	0.26%	6,201	0.50%	0.000806322	507	0.00986	0.99%	-0.237%
086	SMYTH	.2100	6	0.31%	4,855	0.39%	0.001235839	430	0.01395	1.40%	-0.077%
087	SOUTHAMPTON	.2896	2	0.10%	2,887	0.23%	0.000692761	203	0.00985	0.99%	-0.127%
088	SPOTSYLVANIA	.3593	57	2.95%	23,585	1.88%	0.00241679	1,766	0.03228	3.23%	1.066%
089	STAFFORD	.3362	54	2.80%	27,257	2.18%	0.001981142	1,999	0.02701	2.70%	0.618%
090	SURRY	.6955	0	0.00%	977	0.08%	0	118	0.00000	0.00%	-0.078%
091	SUSSEX	.3213	0	0.00%	1,201	0.10%	0	119	0.00000	0.00%	-0.096%
092	TAZEWELL	.2487	3	0.16%	6,623	0.53%	0.000452967	508	0.00591	0.59%	-0.374%
093	WARREN	.4204	2	0.10%	5,452	0.44%	0.000366838	422	0.00474	0.47%	-0.332%
094	WASHINGTON	.3165	5	0.26%	7,411	0.59%	0.000674673	605	0.00826	0.83%	-0.333%
095	WESTMORELAND	.5020	1	0.05%	1,741	0.14%	0.000574383	137	0.00730	0.73%	-0.087%
096	WISE	.1885	0	0.00%	6,655	0.53%	0	572	0.00000	0.00%	-0.532%
097	WYTHE	.3142	7	0.36%	4,369	0.35%	0.001602197	344	0.02035	2.03%	0.013%
098	YORK	.3727	19	0.98%	12,619	1.01%	0.001505666	912	0.02083	2.08%	-0.025%
101	ALEXANDRIA	.8000	35	1.81%	11,999	0.96%	0.00291691	1,230	0.02846	2.85%	0.853%
102	BRISTOL	.3132	3	0.16%	2,397	0.19%	0.001251564	204	0.01471	1.47%	-0.036%
103	BUENA VISTA	.1932	0	0.00%	1,135	0.09%	0	97	0.00000	0.00%	-0.091%
104	CHARLOTTESVILLE	.6560	3	0.16%	4,030	0.32%	0.000744417	421	0.00713	0.71%	-0.167%

Appendix C continues

Appendix C continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	NBCT Concentration Relative to # Students	# Instructional Personnel	% of Total Instructional Personnel in VA	NBCT Concentration Relative to Instructional Personnel	Diff. between Student % and NBCT%
106	COLONIAL HEIGHTS	.4428	1	0.05%	2,927	0.23%	0.000341647	266	0.00376	0.38%	-0.182%
107	COVINGTON	.2597	2	0.10%	980	0.08%	0.002040816	85	0.02353	2.35%	0.025%
108	DANVILLE	.2470	1	0.05%	6,416	0.51%	0.00015586	573	0.00175	0.17%	-0.461%
109	FALLS CHURCH	.8000	14	0.72%	2,084	0.17%	0.00671785	217	0.06452	6.45%	0.558%
110	FREDERICKSBURG	.7763	4	0.21%	3,220	0.26%	0.001242236	236	0.01695	1.69%	-0.050%
111	GALAX	.2695	1	0.05%	1,314	0.10%	0.000761035	113	0.00885	0.88%	-0.053%
112	HAMPTON	.2690	100	5.18%	21,568	1.72%	0.004636499	1,627	0.06146	6.15%	3.453%
113	HARRISONBURG	.4133	5	0.26%	4,822	0.39%	0.001036914	480	0.01042	1.04%	-0.126%
114	HOPEWELL	.2285	1	0.05%	4,235	0.34%	0.000236128	346	0.00289	0.29%	-0.287%
115	LYNCHBURG	.3643	6	0.31%	8,646	0.69%	0.000693963	768	0.00781	0.78%	-0.380%
116	MARTINSVILLE	.2263	3	0.16%	2,379	0.19%	0.001261034	204	0.01471	1.47%	-0.035%
117	NEWPORT NEWS	.2778	63	3.26%	30,488	2.44%	0.002066387	2,481	0.02539	2.54%	0.826%
118	NORFOLK	.3004	19	0.98%	33,787	2.70%	0.000562346	2,750	0.00691	0.69%	-1.715%
119	NORTON	.3042	0	0.00%	876	0.07%	0	67	0.00000	0.00%	-0.070%
120	PETERSBURG	.2255	1	0.05%	4,557	0.36%	0.000219443	373	0.00268	0.27%	-0.312%
121	PORTSMOUTH	.2497	3	0.16%	15,126	1.21%	0.000198334	1,098	0.00273	0.27%	-1.053%
122	RADFORD	.3251	5	0.26%	1,567	0.13%	0.00319081	136	0.03676	3.68%	0.134%
123	RICHMOND CITY	.4945	38	1.97%	23,454	1.87%	0.001620193	2,100	0.01810	1.81%	0.093%
124	ROANOKE CITY	.3582	27	1.40%	13,039	1.04%	0.002070711	1,114	0.02424	2.42%	0.356%
126	STAUNTON	.4024	2	0.10%	2,665	0.21%	0.000750469	254	0.00787	0.79%	-0.109%
127	SUFFOLK	.3432	3	0.16%	14,507	1.16%	0.000206797	1,100	0.00273	0.27%	-1.003%
128	VIRGINIA BEACH	.4060	102	5.28%	71,185	5.69%	0.001432886	5,560	0.01835	1.83%	-0.406%
130	WAYNESBORO	.3609	3	0.16%	3,298	0.26%	0.000909642	264	0.01136	1.14%	-0.108%
131	WILLIAMSBURG	.8000	39	2.02%	10,857	0.87%	0.003592153	898	0.04343	4.34%	1.151%
132	WINCHESTER	.5124	8	0.41%	3,960	0.32%	0.002020202	350	0.02286	2.29%	0.098%

Appendix C continues

Appendix C continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	NBCT Concentration Relative to # Students	# Instructional Personnel	% of Total Instructional Personnel in VA	NBCT Concentration Relative to Instructional Personnel	Diff. between Student % and NBCT%
135	FRANKLIN CITY	.3047	0	0.00%	1,283	0.10%	0	115	0.00000	0.00%	-0.102%
136	CHESAPEAKE	.3465	32	1.66%	39,748	3.17%	0.000805072	2,927	0.01093	1.09%	-1.519%
137	LEXINGTON	.4601	1	0.05%	488	0.04%	0.00204918	48	0.02083	2.08%	0.013%
139	SALEM	.3516	23	1.19%	3,932	0.31%	0.00584944	308	0.07468	7.47%	0.876%
142	POQUOSON	.3524	1	0.05%	2,324	0.19%	0.000430293	185	0.00541	0.54%	-0.134%
143	MANASSAS	.4005	22	1.14%	6,986	0.56%	0.003149155	529	0.04159	4.16%	0.581%
144	MANASSAS PARK	.3311	11	0.57%	2,957	0.24%	0.003719986	202	0.05446	5.45%	0.333%
202	COLONIAL BEACH	.3785	0	0	590	0.05%	0	55	0.00000	0.00%	-0.047%
207	WEST POINT	.2667	5	0.26%	771	0.06%	0.006485084	66	0.07576	7.58%	0.197%
	STATE TOTALS		1,934		1,251,949		0.001544791	98,857	0.01956	1.96%	

Appendix D

High Concentration Divisions Based On Percentage Of State Total

Virginia Public School Division	# NBCTs	% of Total NBC in Virginia
029-Fairfax County Public Schools	346	17.91%
075-Prince William County Public Schools	129	6.68%
007-Arlington County Public Schools	123	6.37%
128-Virginia Beach City Public Schools	102	5.28%
112-Hampton City Public Schools	100	5.18%
053-Loudoun County Public Schools	90	4.66%
021-Chesterfield County Public Schools	88	4.55%
043-Henrico County Public Schools	86	4.45%
042-Hanover County Public Schools	63	3.26%
117-Newport News City Public Schools	63	3.26%
088-Spotsylvania County Public Schools	57	2.95%
089-Stafford County Public Schools	54	2.80%
131-Williamsburg-James City County Public Schools	39	2.02%
123-Richmond City Public Schools	38	1.97%
101-Alexandria City Public Schools	35	1.81%
136-Chesapeake City Public Schools	32	1.66%
060-Montgomery County Public Schools	27	1.40%
124-Roanoke City Public Schools	27	1.40%
030-Fauquier County Public Schools	23	1.19%
139-Salem City Public Schools	23	1.19%
143-Manassas City Public Schools	22	1.14%
033-Franklin County Public Schools	21	1.09%
098-York County Public Schools	19	0.98%
118-Norfolk City Public Schools	19	0.98%
034-Frederick County Public Schools	16	0.83%
002-Albemarle County Public Schools	15	0.78%
012-Botetourt County Public Schools	15	0.78%
082-Rockingham County Public Schools	15	0.78%
080-Roanoke County Public Schools	14	0.72%
109-Falls Church City Public Schools	14	0.72%
036-Gloucester County Public Schools	11	0.57%
144-Manassas Park City Public Schools	11	0.57%
046-Isle of Wight County Public Schools	10	0.52%
010-Bedford County Public Schools	9	0.47%
024-Culpeper County Public Schools	8	0.41%

Appendix D contin

Appendix D continued

Virginia Public School Division	# NBCTs	% of Total NBCTs in Virginia
132-Winchester City Public Schools	8	0.41%
097-Wythe County Public Schools	7	0.36%
086-Smyth County Public Schools	6	0.31%
115-Lynchburg City Public Schools	6	0.31%
032-Fluvanna County Public Schools	5	0.26%
038-Grayson County Public Schools	5	0.26%
039-Greene County Public Schools	5	0.26%
085-Shenandoah County Public Schools	5	0.26%
094-Washington County Public Schools	5	0.26%
113-Harrisonburg City Public Schools	5	0.26%
122-Radford City Public Schools	5	0.26%
207-West Point Public Schools	5	0.26%
003-Alleghany County Public Schools	4	0.21%
005-Amherst County Public Schools	4	0.21%
020-Charlotte County Public Schools	4	0.21%
048-King George County Public Schools	4	0.21%
074-Prince George County Public Schools	4	0.21%
077-Pulaski County Public Schools	4	0.21%
110-Fredericksburg City Public Schools	4	0.21%
092-Tazewell County Public Schools	3	0.16%
102-Bristol City Public Schools	3	0.16%
104-Charlottesville City Public Schools	3	0.16%
116-Martinsville City Public Schools	3	0.16%
121-Portsmouth City Public Schools	3	0.16%
127-Suffolk City Public Schools	3	0.16%
130-Waynesboro City Public Schools	3	0.16%
008-Augusta County Public Schools	2	0.10%
031-Floyd County Public Schools	2	0.10%
044-Henry County Public Schools	2	0.10%
045-Highland County Public Schools	2	0.10%
051-Lancaster County Public Schools	2	0.10%
054-Louisa County Public Schools	2	0.10%
071-Pittsylvania County Public Schools	2	0.10%
072-Powhatan County Public Schools	2	0.10%
087-Southampton County Public Schools	2	0.10%
093-Warren County Public Schools	2	0.10%
107-Covington City Public Schools	2	0.10%
126-Staunton City Public Schools	2	0.10%
004-Amelia County Public Schools	1	0.05%

Appendix D continues

Appendix D continued

Virginia Public School Division	# NBCTs	% of Total NBCTs in Virginia
006-Appomattox County Public Schools	1	0.05%
011-Bland County Public Schools	1	0.05%
014-Buchanan County Public Schools	1	0.05%
016-Campbell County Public Schools	1	0.05%
017-Caroline County Public Schools	1	0.05%
022-Clarke County Public Schools	1	0.05%
025-Cumberland County Public Schools	1	0.05%
027-Dinwiddie County Public Schools	1	0.05%
028-Essex County Public Schools	1	0.05%
037-Goochland County Public Schools	1	0.05%
041-Halifax County Public Schools	1	0.05%
056-Madison County Public Schools	1	0.05%
059-Middlesex County Public Schools	1	0.05%
063-New Kent County Public Schools	1	0.05%
065-Northampton County Public Schools	1	0.05%
067-Nottoway County Public Schools	1	0.05%
068-Orange County Public Schools	1	0.05%
070-Patrick County Public Schools	1	0.05%
083-Russell County Public Schools	1	0.05%
095-Westmoreland County Public Schools	1	0.05%
106-Colonial Heights City Public Schools	1	0.05%
108-Danville City Public Schools	1	0.05%
111-Galax City Public Schools	1	0.05%
114-Hopewell City Public Schools	1	0.05%
120-Petersburg City Public Schools	1	0.05%
137-Lexington City Public Schools	1	0.05%
142-Poquoson City Public Schools	1	0.05%
001-Accomack County Public Schools	0	0.00%
009-Bath County Public Schools	0	0.00%
013-Brunswick County Public Schools	0	0.00%
015-Buckingham County Public Schools	0	0.00%
018-Carroll County Public Schools	0	0.00%
019-Charles City County Public Schools	0	0.00%
023-Craig County Public Schools	0	0.00%
026-Dickenson County Public Schools	0	0.00%
035-Giles County Public Schools	0	0.00%
040-Greensville County Public Schools	0	0.00%
049-King and Queen County Public Schools	0	0.00%
050-King William County Public Schools	0	0.00%

Appendix D continues

Appendix D continued

Virginia Public School Division	# NBCTs	% of Total NBCTs in Virginia
052-Lee County Public Schools	0	0.00%
055-Lunenburg County Public Schools	0	0.00%
057-Mathews County Public Schools	0	0.00%
058-Mecklenburg County Public Schools	0	0.00%
062-Nelson County Public Schools	0	0.00%
066-Northumberland County Public Schools	0	0.00%
069-Page County Public Schools	0	0.00%
073-Prince Edward County Public Schools	0	0.00%
078-Rappahannock County Public Schools	0	0.00%
079-Richmond County Public Schools	0	0.00%
081-Rockbridge County Public Schools	0	0.00%
084-Scott County Public Schools	0	0.00%
090-Surry County Public Schools	0	0.00%
091-Sussex County Public Schools	0	0.00%
096-Wise County Public Schools	0	0.00%
103-Buena Vista City Public Schools	0	0.00%
119-Norton City Public Schools	0	0.00%
135-Franklin City Public Schools	0	0.00%
202-Colonial Beach Public Schools	0	0.00%

Appendix E

High Concentration Divisions Based On Student Population

Virginia Public School Division	# NBCTs	Student Population	Concentration of NBCTs to Students
045-Highland County Public Schools	2	238	0.008403361
109-Falls Church City Public Schools	14	2,084	0.00671785
207-West Point Public Schools	5	771	0.006485084
139-Salem City Public Schools	23	3,932	0.00584944
007-Arlington County Public Schools	123	21,485	0.005724924
112-Hampton City Public Schools	100	21,568	0.004636499
144-Manassas Park City Public Schools	11	2,957	0.003719986
131-Williamsburg-James City County Public Schools	39	10,857	0.003592153
042-Hanover County Public Schools	63	18,628	0.003382006
122-Radford City Public Schools	5	1,567	0.00319081
143-Manassas City Public Schools	22	6,986	0.003149155
012-Botetourt County Public Schools	15	5,009	0.00299461
101-Alexandria City Public Schools	35	11,999	0.00291691
033-Franklin County Public Schools	21	7,408	0.002834773
060-Montgomery County Public Schools	27	9,553	0.002826337
038-Grayson County Public Schools	5	1,950	0.002564103
088-Spotsylvania County Public Schools	57	23,585	0.00241679
124-Roanoke City Public Schools	27	13,039	0.002070711
117-Newport News City Public Schools	63	30,488	0.002066387
137-Lexington City Public Schools	1	488	0.00204918
107-Covington City Public Schools	2	980	0.002040816
030-Fauquier County Public Schools	23	11,286	0.002037923
132-Winchester City Public Schools	8	3,960	0.002020202
029-Fairfax County Public Schools	346	174,479	0.001983047
089-Stafford County Public Schools	54	27,257	0.001981142
020-Charlotte County Public Schools	4	2,125	0.001882353
036-Gloucester County Public Schools	11	6,015	0.001828761
046-Isle of Wight County Public Schools	10	5,515	0.001813237
043-Henrico County Public Schools	86	49,405	0.001740715
039-Greene County Public Schools	5	2,882	0.001734906
075-Prince William County Public Schools	129	79,358	0.001625545
123-Richmond City Public Schools	38	23,454	0.001620193
097-Wythe County Public Schools	7	4,369	0.001602197
051-Lancaster County Public Schools	2	1,321	0.001514005
098-York County Public Schools	19	12,619	0.001505666
021-Chesterfield County Public Schools	88	59,243	0.001485408

Appendix E continues

Appendix E continued

Virginia Public School Division	# NBCTs	Student Population	Concentration of NBCTs to Students
128-Virginia Beach City Public Schools	102	71,185	0.001432886
003-Alleghany County Public Schools	4	2,804	0.001426534
053-Loudoun County Public Schools	90	63,142	0.001425359
032-Fluvanna County Public Schools	5	3,773	0.001325205
116-Martinsville City Public Schools	3	2,379	0.001261034
082-Rockingham County Public Schools	15	11,921	0.001258284
102-Bristol City Public Schools	3	2,397	0.001251564
110-Fredericksburg City Public Schools	4	3,220	0.001242236
086-Smyth County Public Schools	6	4,855	0.001235839
034-Frederick County Public Schools	16	13,143	0.001217378
002-Albemarle County Public Schools	15	13,212	0.001135332
011-Bland County Public Schools	1	897	0.001114827
024-Culpeper County Public Schools	8	7,710	0.001037613
113-Harrisonburg City Public Schools	5	4,822	0.001036914
031-Floyd County Public Schools	2	2,071	0.000965717
080-Roanoke County Public Schools	14	14,622	0.000957461
048-King George County Public Schools	4	4,223	0.000947194
130-Waynesboro City Public Schools	3	3,298	0.000909642
005-Amherst County Public Schools	4	4,599	0.000869754
077-Pulaski County Public Schools	4	4,685	0.000853789
010-Bedford County Public Schools	9	10,592	0.000849698
059-Middlesex County Public Schools	1	1,191	0.000839631
085-Shenandoah County Public Schools	5	6,201	0.000806322
136-Chesapeake City Public Schools	32	39,748	0.000805072
111-Galax City Public Schools	1	1,314	0.000761035
126-Staunton City Public Schools	2	2,665	0.000750469
104-Charlottesville City Public Schools	3	4,030	0.000744417
115-Lynchburg City Public Schools	6	8,646	0.000693963
087-Southampton County Public Schools	2	2,887	0.000692761
094-Washington County Public Schools	5	7,411	0.000674673
025-Cumberland County Public Schools	1	1,503	0.000665336
074-Prince George County Public Schools	4	6,357	0.000629228
028-Essex County Public Schools	1	1,634	0.000611995
095-Westmoreland County Public Schools	1	1,741	0.000574383
118-Norfolk City Public Schools	19	33,787	0.000562346
065-Northampton County Public Schools	1	1,800	0.000555556
004-Amelia County Public Schools	1	1,815	0.000550964
056-Madison County Public Schools	1	1,849	0.000540833

Appendix E continues

Appendix E continued

Virginia Public School Division	# NBCTs	Student Population	Concentration of NBCTs to Students
022-Clarke County Public Schools	1	2,082	0.000480307
092-Tazewell County Public Schools	3	6,623	0.000452967
072-Powhatan County Public Schools	2	4,476	0.000446828
006-Appomattox County Public Schools	1	2,300	0.000434783
142-Poquoson City Public Schools	1	2,324	0.000430293
067-Nottoway County Public Schools	1	2,347	0.000426076
054-Louisa County Public Schools	2	4,731	0.000422744
037-Goochland County Public Schools	1	2,481	0.000403063
070-Patrick County Public Schools	1	2,581	0.000387447
093-Warren County Public Schools	2	5,452	0.000366838
063-New Kent County Public Schools	1	2,888	0.00034626
106-Colonial Heights City Public Schools	1	2,927	0.000341647
014-Buchanan County Public Schools	1	3,333	0.00030003
044-Henry County Public Schools	2	7,491	0.000266987
114-Hopewell City Public Schools	1	4,235	0.000236128
017-Caroline County Public Schools	1	4,257	0.000234907
083-Russell County Public Schools	1	4,333	0.000230787
120-Petersburg City Public Schools	1	4,557	0.000219443
027-Dinwiddie County Public Schools	1	4,570	0.000218818
071-Pittsylvania County Public Schools	2	9,258	0.000216029
127-Suffolk City Public Schools	3	14,507	0.000206797
121-Portsmouth City Public Schools	3	15,126	0.000198334
068-Orange County Public Schools	1	5,237	0.000190949
008-Augusta County Public Schools	2	10,769	0.000185718
041-Halifax County Public Schools	1	5,910	0.000169205
108-Danville City Public Schools	1	6,416	0.00015586
016-Campbell County Public Schools	1	8,528	0.000117261
001-Accomack County Public Schools	0	5,088	0
009-Bath County Public Schools	0	658	0
013-Brunswick County Public Schools	0	2,097	0
015-Buckingham County Public Schools	0	2,035	0
018-Carroll County Public Schools	0	4,471	0
019-Charles City County Public Schools	0	844	0
023-Craig County Public Schools	0	718	0
026-Dickenson County Public Schools	0	2,521	0
035-Giles County Public Schools	0	2,507	0
040-Greensville County Public Schools	0	2,669	0
049-King and Queen County Public Schools	0	781	0

Appendix E continues

Appendix E continued

Virginia Public School Division	# NBCTs	Student Population	Concentration of NBCTs to Students
050-King William County Public Schools	0	2,239	0
052-Lee County Public Schools	0	3,597	0
055-Lunenburg County Public Schools	0	1,653	0
057-Mathews County Public Schools	0	1,212	0
058-Mecklenburg County Public Schools	0	4,816	0
062-Nelson County Public Schools	0	1,966	0
066-Northumberland County Public Schools	0	1,474	0
069-Page County Public Schools	0	3,697	0
073-Prince Edward County Public Schools	0	2,551	0
078-Rappahannock County Public Schools	0	928	0
079-Richmond County Public Schools	0	1,214	0
081-Rockbridge County Public Schools	0	2,798	0
084-Scott County Public Schools	0	3,970	0
090-Surry County Public Schools	0	977	0
091-Sussex County Public Schools	0	1,201	0
096-Wise County Public Schools	0	6,655	0
103-Buena Vista City Public Schools	0	1,135	0
119-Norton City Public Schools	0	876	0
135-Franklin City Public Schools	0	1,283	0
202-Colonial Beach Public Schools	0	590	0

Appendix F

High Concentration Divisions Based On Instructional Personnel

Virginia Public School Division	# NBCTs	Total Instructional Personnel	Concentration among Division Staff
207-West Point Public Schools	5	66	0.0758
139-Salem City Public Schools	23	308	0.0747
007-Arlington County Public Schools	123	1,696	0.0725
109-Falls Church City Public Schools	14	217	0.0645
112-Hampton City Public Schools	100	1,627	0.0615
045-Highland County Public Schools	2	34	0.0588
144-Manassas Park City Public Schools	11	202	0.0545
131-Williamsburg-James City County Public Schools	39	898	0.0434
042-Hanover County Public Schools	63	1,493	0.0422
143-Manassas City Public Schools	22	529	0.0416
012-Botetourt County Public Schools	15	403	0.0372
122-Radford City Public Schools	5	136	0.0368
033-Franklin County Public Schools	21	625	0.0336
088-Spotsylvania County Public Schools	57	1,766	0.0323
060-Montgomery County Public Schools	27	862	0.0313
101-Alexandria City Public Schools	35	1,230	0.0285
038-Grayson County Public Schools	5	182	0.0275
089-Stafford County Public Schools	54	1,999	0.0270
117-Newport News City Public Schools	63	2,481	0.0254
020-Charlotte County Public Schools	4	160	0.0250
046-Isle of Wight County Public Schools	10	407	0.0246
075-Prince William County Public Schools	129	5,267	0.0245
029-Fairfax County Public Schools	346	14,272	0.0242
124-Roanoke City Public Schools	27	1,114	0.0242
036-Gloucester County Public Schools	11	459	0.0240
030-Fauquier County Public Schools	23	972	0.0237
107-Covington City Public Schools	2	85	0.0235
043-Henrico County Public Schools	86	3,671	0.0234
132-Winchester City Public Schools	8	350	0.0229
021-Chesterfield County Public Schools	88	4,123	0.0213
098-York County Public Schools	19	912	0.0208
137-Lexington City Public Schools	1	48	0.0208
097-Wythe County Public Schools	7	344	0.0203
039-Greene County Public Schools	5	255	0.0196

Appendix F continues

Appendix F continued

Virginia Public School Division	# NBCTs	Total Instructional Personnel	Concentration among Division Staff
053-Loudoun County Public Schools	90	4,858	0.0185
128-Virginia Beach City Public Schools	102	5,560	0.0183
123-Richmond City Public Schools	38	2,100	0.0181
003-Alleghany County Public Schools	4	228	0.0175
110-Fredericksburg City Public Schools	4	236	0.0169
032-Fluvanna County Public Schools	5	309	0.0162
082-Rockingham County Public Schools	15	937	0.0160
034-Frederick County Public Schools	16	1,016	0.0157
102-Bristol City Public Schools	3	204	0.0147
116-Martinsville City Public Schools	3	204	0.0147
086-Smyth County Public Schools	6	430	0.0140
024-Culpeper County Public Schools	8	580	0.0138
002-Albemarle County Public Schools	15	1,116	0.0134
048-King George County Public Schools	4	299	0.0134
011-Bland County Public Schools	1	83	0.0120
080-Roanoke County Public Schools	14	1,175	0.0119
031-Floyd County Public Schools	2	170	0.0118
130-Waynesboro City Public Schools	3	264	0.0114
136-Chesapeake City Public Schools	32	2,927	0.0109
010-Bedford County Public Schools	9	830	0.0108
077-Pulaski County Public Schools	4	384	0.0104
113-Harrisonburg City Public Schools	5	480	0.0104
085-Shenandoah County Public Schools	5	507	0.0099
087-Southampton County Public Schools	2	203	0.0099
005-Amherst County Public Schools	4	429	0.0093
111-Galax City Public Schools	1	113	0.0088
059-Middlesex County Public Schools	1	115	0.0087
025-Cumberland County Public Schools	1	116	0.0086
051-Lancaster County Public Schools	1	116	0.0086
074-Prince George County Public Schools	4	479	0.0084
094-Washington County Public Schools	5	605	0.0083
004-Amelia County Public Schools	1	127	0.0079
126-Staunton City Public Schools	2	254	0.0079
115-Lynchburg City Public Schools	6	768	0.0078
028-Essex County Public Schools	1	131	0.0076
095-Westmoreland County Public Schools	1	137	0.0073
104-Charlottesville City Public Schools	3	421	0.0071
118-Norfolk City Public Schools	19	2,750	0.0069

Appendix F continues

Appendix F continued

Virginia Public School Division	# NBCTs	Total Instructional Personnel	Concentration among Division Staff
056-Madison County Public Schools	1	154	0.0065
022-Clarke County Public Schools	1	157	0.0064
092-Tazewell County Public Schools	3	508	0.0059
065-Northampton County Public Schools	1	170	0.0059
067-Nottoway County Public Schools	1	175	0.0057
072-Powhatan County Public Schools	2	356	0.0056
006-Appomattox County Public Schools	1	181	0.0055
142-Poquoson City Public Schools	1	185	0.0054
054-Louisa County Public Schools	2	382	0.0052
037-Goochland County Public Schools	1	205	0.0049
070-Patrick County Public Schools	1	211	0.0047
093-Warren County Public Schools	2	422	0.0047
063-New Kent County Public Schools	1	216	0.0046
041-Halifax County Public Schools	2	494	0.0040
106-Colonial Heights City Public Schools	1	266	0.0038
044-Henry County Public Schools	2	557	0.0036
014-Buchanan County Public Schools	1	287	0.0035
017-Caroline County Public Schools	1	300	0.0033
083-Russell County Public Schools	1	334	0.0030
114-Hopewell City Public Schools	1	346	0.0029
027-Dinwiddie County Public Schools	1	349	0.0029
068-Orange County Public Schools	1	360	0.0028
121-Portsmouth City Public Schools	3	1,098	0.0027
127-Suffolk City Public Schools	3	1,100	0.0027
071-Pittsylvania County Public Schools	2	743	0.0027
120-Petersburg City Public Schools	1	373	0.0027
008-Augusta County Public Schools	2	864	0.0023
108-Danville City Public Schools	1	573	0.0017
016-Campbell County Public Schools	1	628	0.0016
001-Accomack County Public Schools	0	419	0.0000
009-Bath County Public Schools	0	69	0.0000
013-Brunswick County Public Schools	0	179	0.0000
015-Buckingham County Public Schools	0	169	0.0000
018-Carroll County Public Schools	0	377	0.0000
019-Charles City County Public Schools	0	79	0.0000
023-Craig County Public Schools	0	65	0.0000
026-Dickenson County Public Schools	0	227	0.0000
035-Giles County Public Schools	0	209	0.0000
040-Greensville County Public Schools	0	216	0.0000

Appendix F continues

Appendix F continued

Virginia Public School Division	# NBCTs	Total Instructional Personnel	Concentration among Division Staff
049-King and Queen County Public Schools	0	72	0.0000
050-King William County Public Schools	0	173	0.0000
052-Lee County Public Schools	0	369	0.0000
055-Lunenburg County Public Schools	0	137	0.0000
057-Mathews County Public Schools	0	107	0.0000
058-Mecklenburg County Public Schools	0	428	0.0000
062-Nelson County Public Schools	0	169	0.0000
066-Northumberland County Public Schools	0	114	0.0000
069-Page County Public Schools	0	303	0.0000
073-Prince Edward County Public Schools	0	222	0.0000
078-Rappahannock County Public Schools	0	81	0.0000
079-Richmond County Public Schools	0	97	0.0000
081-Rockbridge County Public Schools	0	258	0.0000
084-Scott County Public Schools	0	327	0.0000
090-Surry County Public Schools	0	118	0.0000
091-Sussex County Public Schools	0	119	0.0000
096-Wise County Public Schools	0	572	0.0000
103-Buena Vista City Public Schools	0	97	0.0000
119-Norton City Public Schools	0	67	0.0000
135-Franklin City Public Schools	0	115	0.0000
202-Colonial Beach Public Schools	0	55	0.0000

Appendix G

Comparison of Student Enrollment and NBCT Percentages Relative To Virginia Totals

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	Difference between Student% and NBCT%
007	ARLINGTON	.8000	123	6.37%	21,485	1.72%	4.650%
029	FAIRFAX COUNTY	.7126	346	17.91%	174,479	13.94%	3.972%
112	HAMPTON	.2690	100	5.18%	21,568	1.72%	3.453%
042	HANOVER	.4195	63	3.26%	18,628	1.49%	1.773%
131	WILLIAMSBURG	.8000	39	2.02%	10,857	0.87%	1.151%
088	SPOTSYLVANIA	.3593	57	2.95%	23,585	1.88%	1.066%
139	SALEM	.3516	23	1.19%	3,932	0.31%	0.876%
101	ALEXANDRIA	.8000	35	1.81%	11,999	0.96%	0.853%
117	NEWPORT NEWS	.2778	63	3.26%	30,488	2.44%	0.826%
060	MONTGOMERY	.3549	27	1.40%	9,553	0.76%	0.634%
089	STAFFORD	.3362	54	2.80%	27,257	2.18%	0.618%
143	MANASSAS	.4005	22	1.14%	6,986	0.56%	0.581%
109	FALLS CHURCH	.8000	14	0.72%	2,084	0.17%	0.558%
043	HENRICO	.4370	86	4.45%	49,405	3.95%	0.505%
033	FRANKLIN COUNTY	.4011	21	1.09%	7,408	0.59%	0.495%
012	BOTETOURT	.3682	15	0.78%	5,009	0.40%	0.376%
124	ROANOKE CITY	.3582	27	1.40%	13,039	1.04%	0.356%
075	PRINCE WILLIAM	.4036	129	6.68%	79,358	6.34%	0.338%
144	MANASSAS PARK	.3311	11	0.57%	2,957	0.24%	0.333%
030	FAUQUIER	.6097	23	1.19%	11,286	0.90%	0.289%
207	WEST POINT	.2667	5	0.26%	771	0.06%	0.197%
122	RADFORD	.3251	5	0.26%	1,567	0.13%	0.134%

Appendix G continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	Difference between Student% and NBCT%
051	LANCASTER	.8000	4	0.21%	1,321	0.11%	0.102%
132	WINCHESTER	.5124	8	0.41%	3,960	0.32%	0.098%
123	RICHMOND CITY	.4945	38	1.97%	23,454	1.87%	0.093%
036	GLOUCESTER	.3703	11	0.57%	6,015	0.48%	0.089%
045	HIGHLAND	.7846	2	0.10%	238	0.02%	0.085%
046	ISLE OF WIGHT	.3926	10	0.52%	5,515	0.44%	0.077%
020	CHARLOTTE	.2288	4	0.21%	2,125	0.17%	0.037%
039	GREENE	.3500	5	0.26%	2,882	0.23%	0.029%
107	COVINGTON	.2597	2	0.10%	980	0.08%	0.025%
097	WYTHE	.3142	7	0.36%	4,369	0.35%	0.013%
137	LEXINGTON	.4601	1	0.05%	488	0.04%	0.013%
003	ALLEGHANY	.2151	4	0.21%	2,804	0.22%	-0.017%
011	BLAND	.2723	1	0.05%	897	0.07%	-0.020%
098	YORK	.3727	19	0.98%	12,619	1.01%	-0.025%
116	MARTINSVILLE	.2263	3	0.16%	2,379	0.19%	-0.035%
102	BRISTOL	.3132	3	0.16%	2,397	0.19%	-0.036%
032	FLUVANNA	.3867	5	0.26%	3,773	0.30%	-0.043%
059	MIDDLESEX	.7430	1	0.05%	1,191	0.10%	-0.043%
202	COLONIAL BEACH	.3785	0	0	590	0.05%	-0.047%
110	FREDERICKSBURG	.7763	4	0.21%	3,220	0.26%	-0.050%
009	BATH	.8000	0	0.00%	658	0.05%	-0.053%
111	GALAX	.2695	1	0.05%	1,314	0.10%	-0.053%
023	CRAIG	.2903	0	0.00%	718	0.06%	-0.057%
031	FLOYD	.3470	2	0.10%	2,071	0.17%	-0.062%
049	KING AND QUEEN	.4404	0	0.00%	781	0.06%	-0.062%
019	CHARLES CITY	.4203	0	0.00%	844	0.07%	-0.067%

Appendix G continues

Appendix G continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	Difference between Student% and NBCT%
025	CUMBERLAND	.2805	1	0.05%	1,503	0.12%	-0.068%
119	NORTON	.3042	0	0.00%	876	0.07%	-0.070%
078	RAPPAHANNOCK	.8000	0	0.00%	928	0.07%	-0.074%
086	SMYTH	.2100	6	0.31%	4,855	0.39%	-0.077%
090	SURRY	.6955	0	0.00%	977	0.08%	-0.078%
028	ESSEX	.4868	1	0.05%	1,634	0.13%	-0.079%
095	WESTMORELAND	.5020	1	0.05%	1,741	0.14%	-0.087%
103	BUENA VISTA	.1932	0	0.00%	1,135	0.09%	-0.091%
065	NORTHAMPTON	.5109	1	0.05%	1,800	0.14%	-0.092%
004	AMELIA	.3472	1	0.05%	1,815	0.14%	-0.093%
056	MADISON	.5204	1	0.05%	1,849	0.15%	-0.096%
091	SUSSEX	.3213	0	0.00%	1,201	0.10%	-0.096%
057	MATHEWS	.5882	0	0.00%	1,212	0.10%	-0.097%
079	RICHMOND COUNTY	.3562	0	0.00%	1,214	0.10%	-0.097%
135	FRANKLIN CITY	.3047	0	0.00%	1,283	0.10%	-0.102%
130	WAYNESBORO	.3609	3	0.16%	3,298	0.26%	-0.108%
126	STAUNTON	.4024	2	0.10%	2,665	0.21%	-0.109%
022	CLARKE	.5346	1	0.05%	2,082	0.17%	-0.115%
066	NORTHUMBERLAND	.8000	0	0.00%	1,474	0.12%	-0.118%
113	HARRISONBURG	.4133	5	0.26%	4,822	0.39%	-0.126%
087	SOUTHAMPTON	.2896	2	0.10%	2,887	0.23%	-0.127%
048	KING GEORGE	.3875	4	0.21%	4,223	0.34%	-0.130%
006	APPOMATTOX	.2732	1	0.05%	2,300	0.18%	-0.132%
055	LUNENBURG	.2308	0	0.00%	1,653	0.13%	-0.132%
142	POQUOSON	.3524	1	0.05%	2,324	0.19%	-0.134%
067	NOTTOWAY	.2547	1	0.05%	2,347	0.19%	-0.136%

Appendix G continues

Appendix G continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	Difference between Student% and NBCT%
037	GOOCHLAND	.8000	1	0.05%	2,481	0.20%	-0.146%
070	PATRICK	.2439	1	0.05%	2,581	0.21%	-0.154%
062	NELSON	.5734	0	0.00%	1,966	0.16%	-0.157%
005	AMHERST	.2664	4	0.21%	4,599	0.37%	-0.160%
015	BUCKINGHAM	.2738	0	0.00%	2,035	0.16%	-0.163%
104	CHARLOTTESVILLE	.6560	3	0.16%	4,030	0.32%	-0.167%
077	PULASKI	.2870	4	0.21%	4,685	0.37%	-0.167%
013	BRUNSWICK	.2728	0	0.00%	2,097	0.17%	-0.167%
082	ROCKINGHAM	.3489	15	0.78%	11,921	0.95%	-0.176%
021	CHESTERFIELD	.3551	88	4.55%	59,243	4.73%	-0.177%
050	KING WILLIAM	.3291	0	0.00%	2,239	0.18%	-0.179%
063	NEW KENT	.4312	1	0.05%	2,888	0.23%	-0.179%
106	COLONIAL HEIGHTS	.4428	1	0.05%	2,927	0.23%	-0.182%
035	GILES	.2649	0	0.00%	2,507	0.20%	-0.200%
026	DICKENSON	.1940	0	0.00%	2,521	0.20%	-0.201%
024	CULPEPER	.4167	8	0.41%	7,710	0.62%	-0.202%
073	PRINCE EDWARD	.3043	0	0.00%	2,551	0.20%	-0.204%
040	GREENSVILLE	.1998	0	0.00%	2,669	0.21%	-0.213%
014	BUCHANAN	.2849	1	0.05%	3,333	0.27%	-0.214%
034	FREDERICK	.3816	16	0.83%	13,143	1.05%	-0.222%
081	ROCKBRIDGE	.5050	0	0.00%	2,798	0.22%	-0.223%
085	SHENANDOAH	.4029	5	0.26%	6,201	0.50%	-0.237%
072	POWHATAN	.3969	2	0.10%	4,476	0.36%	-0.254%
054	LOUISA	.5392	2	0.10%	4,731	0.38%	-0.274%
002	ALBEMARLE	.6872	15	0.78%	13,212	1.06%	-0.279%
114	HOPEWELL	.2285	1	0.05%	4,235	0.34%	-0.287%

Appendix G continues

Appendix G continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	Difference between Student% and NBCT%
052	LEE	.1692	0	0.00%	3,597	0.29%	-0.287%
017	CAROLINE	.3580	1	0.05%	4,257	0.34%	-0.288%
083	RUSSELL	.2113	1	0.05%	4,333	0.35%	-0.294%
069	PAGE	.3181	0	0.00%	3,697	0.30%	-0.295%
074	PRINCE GEORGE	.2344	4	0.21%	6,357	0.51%	-0.301%
120	PETERSBURG	.2255	1	0.05%	4,557	0.36%	-0.312%
027	DINWIDDIE	.2631	1	0.05%	4,570	0.37%	-0.313%
084	SCOTT	.1821	0	0.00%	3,970	0.32%	-0.317%
093	WARREN	.4204	2	0.10%	5,452	0.44%	-0.332%
094	WASHINGTON	.3165	5	0.26%	7,411	0.59%	-0.333%
018	CARROLL	.2573	0	0.00%	4,471	0.36%	-0.357%
068	ORANGE	.4257	1	0.05%	5,237	0.42%	-0.367%
092	TAZEWELL	.2487	3	0.16%	6,623	0.53%	-0.374%
115	LYNCHBURG	.3643	6	0.31%	8,646	0.69%	-0.380%
010	BEDFORD COUNTY	.4076	9	0.47%	10,592	0.85%	-0.380%
058	MECKLENBURG	.3315	0	0.00%	4,816	0.38%	-0.385%
053	LOUDOUN	.5854	90	4.66%	63,142	5.04%	-0.385%
001	ACCOMACK	.3753	0	0.00%	5,088	0.41%	-0.406%
128	VIRGINIA BEACH	.4060	102	5.28%	71,185	5.69%	-0.406%
041	HALIFAX	.2748	1	0.05%	5,910	0.47%	-0.420%
080	ROANOKE COUNTY	.3460	14	0.72%	14,622	1.17%	-0.443%
108	DANVILLE	.2470	1	0.05%	6,416	0.51%	-0.461%
044	HENRY	.2315	2	0.10%	7,491	0.60%	-0.495%
096	WISE	.1885	0	0.00%	6,655	0.53%	-0.532%
016	CAMPBELL	.2490	1	0.05%	8,528	0.68%	-0.629%
071	PITTSYLVANIA	.2401	2	0.10%	9,258	0.74%	-0.636%

Appendix G continues

Appendix G continued

Div. #	Division	LCI value	# NBCTs	% of State Total NBCTs	Student Enrollment	% of Total Students in VA	Difference between Student% and NBCT%
008	AUGUSTA	.3416	2	0.10%	10,769	0.86%	-0.757%
127	SUFFOLK	.3432	3	0.16%	14,507	1.16%	-1.003%
121	PORTSMOUTH	.2497	3	0.16%	15,126	1.21%	-1.053%
136	CHESAPEAKE	.3465	32	1.66%	39,748	3.17%	-1.519%
118	NORFOLK	.3004	19	0.98%	33,787	2.70%	-1.715%
	STATE TOTALS		1,934		1,251,949		