

# HIGH-POVERTY SCHOOLS AND THE DISTRIBUTION OF TEACHERS AND PRINCIPALS

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*Although many factors combine to make a successful school, most people agree that quality teachers and school principals are among the most important requirements for success, especially when success is defined by the ability of the school to raise the achievement of its students. The central question for this study is how the quality of the teachers and principals in high-poverty schools in North Carolina compares to that in the schools serving more advantaged students. A related question is why these differences emerge. The consistency of the patterns across many measures of qualifications for both teachers and principals leaves no doubt that students in the high-poverty schools are served by school personnel with lower qualifications than those in the lower poverty schools. Moreover, in many cases the differences are large. Additional evidence documents that the differences largely reflect predictable outcomes of the labor market for teachers and principals. Hence, active policy interventions are needed to counter these forces if the ultimate goal is to provide equal educational opportunity.*

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## INTRODUCTION

Many previous studies and policy debates have focused attention on resource disparities in public schooling.<sup>1</sup> During more than thirty years of school finance cases, for example, lawyers and policymakers have objected to wealth-related disparities across school districts in per pupil spending.<sup>2</sup> Further, in the context of civil rights debates, researchers and policymakers have examined disparities in the resources available to students of different races.<sup>3</sup> Though informed by those debates, this study differs by its focus on individual schools rather than districts as the unit of observation, and on poverty rather than race as the key variable of interest. This study also differs by its

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1. See, e.g., JULIAN R. BETTS ET AL., PUB. POLICY INST. OF CAL., EQUAL RESOURCES, EQUAL OUTCOMES? THE DISTRIBUTION OF SCHOOL RESOURCES AND STUDENT ACHIEVEMENT IN CALIFORNIA (2001), [http://www.ppic.org/content/pubs/report/R\\_200JBR.pdf](http://www.ppic.org/content/pubs/report/R_200JBR.pdf) (addressing the distribution of resources and achievement in California public schools); HEATHER G. PESKE & KATI HAYCOCK, EDUC. TRUST, TEACHING INEQUALITY: HOW POOR AND MINORITY STUDENTS ARE SHORTCHANGED ON TEACHER QUALITY (2006), <http://www2.edtrust.org/nr/rdonlyres/010DBD9F-CED8-4D2B-9E0D-91B446746ED3/0/TQReportJune2006.pdf> (discussing and summarizing the effects of teacher quality on student achievement); Charles T. Clotfelter et al., *Who Teaches Whom? Race and the Distribution of Novice Teachers*, 24 ECON. EDUC. REV. 377 (2005) (examining the effect of unequal distribution of inexperienced teachers in North Carolina schools on the achievement gap between black and white students); Hamilton Lankford et al., *Teacher Sorting and the Plight of Urban Schools: A Descriptive Analysis*, 24 EDUC. EVALUATION & POL'Y ANALYSIS 37 (2002) (utilizing empirical data in an effort to demonstrate the vast disparities in teaching quality across New York public schools).

2. For a comprehensive discussion of relevant school finance cases, see William N. Evans et al., *The Property Tax and Education Finance: Uneasy Compromises*, in PROPERTY TAXATION AND LOCAL GOVERNMENT FINANCE 209, 209–33 (Wallace E. Oates ed., 2001). See also Paul A. Minorini & Stephen Sugarman, *School Finance Litigation in the Name of Educational Equity: Its Evolution, Impact, and Future*, in EQUITY AND ADEQUACY IN EDUCATION FINANCE: ISSUES AND PERSPECTIVES 34 (Helen F. Ladd et al. eds., 1999) (outlining the history of school finance litigation and its significance).

3. Clotfelter et al., *supra* note 1, at 377. See generally CHARLES T. CLOTFELTER, AFTER BROWN: THE RISE AND RETREAT OF SCHOOL DESEGREGATION (2004) (examining the disparities in public education even after the Supreme Court's seminal decision in *Brown v. Board of Education*); JAMES S. COLEMAN ET AL., U.S. DEP'T OF HEALTH, EDUC., & WELFARE, EQUALITY OF EDUCATIONAL OPPORTUNITY (1966) (providing the seminal case study of disparities in educational funding).

focus on more finely grained measures of two key resources: the quality of teachers and principals.

Although many factors combine to make a successful school, quality teachers and school principals are among the most important requirements for success, especially when success is defined by the ability of the school to raise the achievement of its students.<sup>4</sup> Teachers are crucial given their daily contact with students in the classroom. The effect of school principals is less direct but nonetheless important. Effective school principals are able to provide school environments that are more conducive to learning, and may be more successful than their less effective peers in attracting, supporting, and retaining high-quality teachers.<sup>5</sup>

Given the importance of teachers and principals, the central question for this Article is how the quality of the teachers and principals in high-poverty schools in North Carolina compares to that in the schools serving more advantaged students. A related question is why these differences arise. This inquiry is important for two reasons. First, it relates directly to questions of social justice interpreted as equal educational opportunity.<sup>6</sup> Second, it bears on the

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4. A number of recent empirical studies document the importance of teachers. See, e.g., Jonah H. Rockoff, *The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data*, 94 AM. ECON. REV. 247, 247–52 (2004) (assessing economic data in an effort to delineate the importance of teachers to student achievement). One strategy used in such studies is to allow the estimated intercepts in an equation explaining variations in student achievement to differ across teachers. The variation in these estimated intercepts is then interpreted as the variation in teacher “quality.” Emerging from such studies is the general consensus that a one standard deviation difference in the quality of teachers as measured in this way generates about a 0.10 standard deviation in achievement in math and a slightly smaller effect in reading. See Daniel Aaronson et al., *Teachers and Student Achievement in the Chicago Public High Schools* 2–30 (Fed. Reserve Bank of Chi., Working Paper No. 2002-28, 2003), available at <http://www.chicagofed.org/publications/workingpapers/papers/wp2002-28.pdf> (utilizing this approach to conduct an economic study involving the Chicago public school system).

5. See, e.g., KENNETH LEITHWOOD, UNIV. OF MINN. CTR. FOR APPLIED RESEARCH & EDUC. IMPROVEMENT, *HOW LEADERSHIP INFLUENCES STUDENT LEARNING* (2004), <http://www.wallacefunds.org/NR/rdonlyres/52BC34B4-2CC3-43D0-9541-9EA37F6D2086/0/HowLeadershipInfluences.pdf>.

6. The term “equal educational opportunity” has been used in different ways in the literature. For this discussion, we define equal educational opportunity either as equal educational inputs or as equal educational outcomes. See, e.g., Helen F. Ladd, *Reflections on Equity, Adequacy, and Weighted Student Funding* (Oct. 23, 2006) (unpublished paper presented at the annual meeting of the Association for Public Policy Analysis and Management) (on file with the North Carolina Law Review). In their classic discussion of school finance equity, Berne and Stiefel use the term equal educational opportunity somewhat differently. Berne and Stiefel use the term to refer to what is more commonly called “fiscal neutrality.” ROBERT BERNE & LEANNA STIEFEL, *THE MEASUREMENT OF EQUITY IN SCHOOL FINANCE: CONCEPTUAL, METHODOLOGICAL, AND EMPIRICAL*

operation of school-based accountability systems designed to put pressure on school personnel to improve student achievement.<sup>7</sup>

One interpretation of equal educational opportunity is that it requires that the quality of schooling provided to students be similar across schools.<sup>8</sup> In particular, it would require that students in high-poverty schools have access to teachers and principals of similar quality to those in schools serving more advantaged students. This input standard of social justice is far less demanding than an alternative standard defined in terms of equality of educational outcomes. Under an outcome standard, equality of resources would not be sufficient. Instead, the schools serving disadvantaged students would need to have more—or higher quality—resources than the other schools to compensate for the educational disadvantages that children from disadvantaged families typically bring to the classroom.<sup>9</sup>

Assuming that one is using inputs as the unit of measurement, the weaker standard of input equality is more straightforward, and the departures from it are easier to quantify than is the case with the more ambitious outcome standard. This conclusion follows, in part, because of the analytic difficulty in determining what precise distribution of inputs would generate equal educational outcomes. Without a clear picture of the required distribution, it is difficult to determine how the actual distribution departs from the required distribution. Moreover, the outcome standard raises some thorny

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DIMENSIONS 17 (1984). In a fiscally neutral system, all school districts within a state have an equal opportunity to attain a given level of per-student spending with a given tax rate. *Id.*

7. Educational accountability systems, as typified by the No Child Left Behind Act of 2001, generally hold each school accountable for the test scores of its students. *See* 20 U.S.C. §§ 6301–6578 (Supp. II 2002). Any systematic unevenness in the distribution of teachers across schools could make it more difficult for some schools to meet the required achievement standards.

8. For a more comprehensive discussion of this standard, see generally Ladd, *supra* note 6 (describing and explaining this interpretation that the quality of public schooling should be similar for all students). *See also* EDWARD B. FISKE & HELEN F. LADD, *ELUSIVE EQUITY: EDUCATION REFORM IN POST-APARTHEID SOUTH AFRICA* (2004) (applying this particular standard of educational reform to post-apartheid South Africa).

9. *See* Ladd, *supra* note 6 (addressing the distribution of school resources under an outcome standard to educational opportunity); *see also* RICHARD ROTHSTEIN, *CLASS AND SCHOOLS: USING SOCIAL, ECONOMIC, AND EDUCATIONAL REFORM TO CLOSE THE BLACK-WHITE ACHIEVEMENT GAP* (2004); Fabio D. Waltenberg & Vincent Vandenberghe, *What Does It Take To Achieve Equality of Opportunity in Education? An Empirical Investigation Based on Brazilian Data*, *ECON. EDUC. REV.* (forthcoming 2007 or 2008) (manuscript at 20–21, on file with the North Carolina Law Review) (addressing the political feasibility of allocating additional resources to impoverished schools in an effort to achieve an equal educational outcome).

issues about the extent to which schooling alone can and should be expected to offset the adverse effects of economic and social disadvantages.<sup>10</sup> In any case, the departures from equity defined in terms of the equality of educational inputs that emerge in this Article may be interpreted as minimum-bound estimates of departures from the more ambitious outcome standard.<sup>11</sup>

Schools in North Carolina are currently subject to the requirements of the state's ABCs accountability program and to those of the federal No Child Left Behind Act of 2001 ("NCLB").<sup>12</sup> Such efforts to hold schools accountable for student achievement make the most sense when schools have equal capacity to perform well.<sup>13</sup> But to the extent that the labor market for teachers and principals works to the disadvantage of the high-poverty schools, that

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10. Objections have been raised on both philosophical and practical grounds. For an example of the philosophical objections, see Amy Gutmann's discussion of why equal opportunity defined in terms of outcomes at the level of the individual student is too ambitious an equity standard. AMY GUTMANN, *DEMOCRATIC EDUCATION* 131-32 (1987). That line of argument leads her in the direction of adequacy and the concept of the threshold level of education necessary to assure that all students will be able to participate fully in the democratic life of the country. The more practical objection is that any serious effort to close achievement gaps will require a variety of social policies that are not part of the traditional school system.

11. Technically, this statement would not hold true under all conditions. However, the statement does hold true for the situation described in this Article because schools with the most challenging-to-educate students have the least qualified teachers and principals. Thus, by an input standard of equal opportunity, those schools are disadvantaged relative to those serving more affluent students. According to an outcome standard of opportunity, the schools serving the hard-to-educate students would be even further disadvantaged since their students are the most challenging to educate and hence would require additional inputs to achieve any given outcome goal.

12. Pub. L. No. 107-110, 115 Stat. 1425 (2002) (codified at 20 U.S.C. §§ 6301-6578 (Supp. II 2002)). Among the provisions of that law are that each state must test all students in reading and math in grades three to eight and that each school is expected to make "adequate yearly progress" toward having all students achieve proficiency by 2014. See 20 U.S.C. § 6311(c)(2). See generally Brandi M. Powell, *Take the Money or Run? The Dilemma of the No Child Left Behind Act for State and Local Governments*, 6 LOY. J. PUB. INT. L. 153 (2005) (examining the impact of NCLB on state and local governments); Thomas Rentschler, *No Child Left Behind: Admirable Goals, Disastrous Outcomes*, 12 WIDENER L. REV. 637 (2006) (providing a more critical analysis of the adverse effects of NCLB on state and local governments). The ABCs accountability program in North Carolina was enacted in 1996 and holds schools accountable for gains in their students' achievement from one year to the next. For a general description of the ABCs program, see generally DEP'T OF PUB. INSTRUCTION, N.C. STATE BD. OF EDUC., *THE ABCS OF PUBLIC EDUCATION* (2006), available at <http://www.ncpublicschools.org/docs/accountability/reporting/abc/2005-06/abc brochure.pdf>. The NCLB requirements were incorporated into the state program for the 2002-03 school year. *Id.* at 2.

13. For a more complete discussion of using schools as the unit of accountability, see Helen F. Ladd, *School-Based Educational Accountability Systems: The Promise and the Pitfalls*, 54 NAT'L TAX J. 385, 390-95 (2001).

view could be both counterproductive and unfair to the teachers and principals in those schools.

The empirical analysis in this Article is based on rich administrative data on teachers and school administrators in North Carolina as provided by the North Carolina Department of Public Instruction through the North Carolina Education Research Center at Duke University. All identifying information was removed from the files before we received them. Although the analysis is based on North Carolina data, the findings are not unique to this state. Indeed, other researchers—most notably Lankford, Loeb, and Wyckoff for New York, and Betts, Reuben, and Danenberg for California—find, as we do, that students attending high-poverty schools have access to teachers with weaker qualifications than their counterparts employed by schools serving more advantaged students.<sup>14</sup> Given the differences between North Carolina and these other states in terms of the power of teacher unions and other aspects of the policy environment, the consistency of the patterns across different states highlights the importance of strong economic and other forces that transcend state policy differences. Far less well studied and documented for other states are patterns related to school principals.

The Article proceeds in Part I with the identification of high-poverty schools. Part II then describes how high-poverty schools fare relative to other schools in terms of the quality of their teachers and principals. In Part III we discuss some of the reasons for the observed patterns, and in Part IV we discuss the policy implications.

### I. DEFINING HIGH-POVERTY SCHOOLS

We focus on schools rather than districts because studying the latter would miss the potentially large differences among schools within a district in terms of the characteristics of the students, the quality of the teachers, and the quality of school leadership. Moreover, given that both the Federal NCLB Act and the North Carolina ABCs accountability program single out the school as the unit of accountability,<sup>15</sup> it is logical to investigate the extent to which schools of differing types are operating on a level playing field in terms of their access to the teaching and leadership resources that are

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14. See Lankford et al., *supra* note 1, at 37–62; BETTS ET AL., *supra* note 1, at 29–31.

15. See DEPT OF PUB. INSTRUCTION, *supra* note 12, at 2 (reiterating that the measures of accountability are “based on performance at the individual school rather than the district level”).

essential for meeting the achievement goals required under those accountability systems.

Throughout this Article we disaggregate the analysis by level of school because elementary, middle, and high schools differ from one another in important ways.<sup>16</sup> Elementary schools, for example, tend to be smaller than schools at higher levels. This small size, together with their neighborhood orientation and the economic and racial segregation that characterizes residential housing patterns, means that they often serve relatively homogeneous groups of students. In addition, students at that level tend to be more willing than older students to declare their eligibility for free lunch, which serves as our measure of student poverty.<sup>17</sup> Finally, given the different responsibilities of principals at the various levels, the labor markets for teachers and principals may differ across the levels, although in ways that are not fully clear.

We follow standard practice in the education literature and measure poverty at the school level by the percentage of students who applied for and were found eligible for the federally sponsored free lunch program (those with incomes below 130% of the poverty line).<sup>18</sup> For simplicity of exposition, we refer to the fraction of students eligible for free lunch as a school's poverty rate, even though some students receiving this benefit come from families with incomes somewhat above the federal poverty threshold.<sup>19</sup> We then rank the schools from high to low in terms of their poverty rates and divide the

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16. For the purposes of our discussion, an elementary school is one that offers any of the elementary school grades (kindergarten through fifth grade) and is not in another category. A middle school is one that offers any grades between five and eight where a plurality of the grades it offers are in this range. A high school is one that serves students in grades nine through twelve where a plurality of grades are in this range. Schools serving all grades are omitted from our analysis. Those schools serving all grades never accounted for more than 2% of all schools.

17. See, e.g., FREDERIC B. GLANTZ ET AL., OFFICE OF ANALYSIS & EVALUATION, U.S. DEP'T OF AGRIC., SCHOOL LUNCH ELIGIBLE NON-PARTICIPANTS 2-9 (1994), available at <http://www.fns.usda.gov/oane/MENU/Published/CNP/FILES/EligNonPart-Pt1.pdf>; CRAIG GUNDERSEN ET AL., U.S. DEP'T OF AGRIC., CERTIFYING ELIGIBILITY IN THE NATIONAL SCHOOL LUNCH PROGRAM (2003), available at <http://www.ers.usda.gov/publications/fanrr34/fanrr34-4/fanrr34-4.pdf>; Phillip M. Gleason, *Participation in the National School Lunch Program and the School Breakfast Program*, 61 AM. J. CLINICAL NUTRITION 213S, 214S-15S (1995).

18. For the purposes of our discussion, we define student poverty by the percentage of students eligible for "free lunch" rather than "free and reduced-price lunch" because of data constraints. Only the free lunch variable is available for all years of the data.

19. We do not believe that this simplification detracts from the overall findings of our study as we are concerned with general trends and not the specific federal poverty threshold.

schools into quartiles based on the percentage of poor students in the school. We define as “high-poverty schools” those in quartile one—in other words, those with the highest poverty rates. Because this is a relative, rather than absolute, definition there is no fixed threshold that distinguishes high-poverty schools at each level. The lowest observed poverty rate for elementary schools in quartile one in 2004 is 60%. The comparable figures are 53% for middle schools and 39% for high schools.

The average measured rates of poverty differ by level of school as shown in Table 1. In this and subsequent tables, we report averages weighted by the size of the school. Hence, the interpretation of the first entry in Table 1 is that about 74% of the schoolmates of the typical student in a quartile one elementary school are receiving free lunch. By construction, the average poverty rates necessarily decline across quartiles. As can be seen, the greatest absolute difference in the average percent poor emerges for elementary schools. For reasons alluded to earlier—small size and reluctance of older students to declare eligibility for free lunch<sup>20</sup>—it is not surprising to find that the average poverty rate in the high-poverty elementary schools exceeds that in the comparable middle and high schools.

Table 1. Percent Poor by Poverty Quartile and Level of School, 2004.  
(averages weighted by size of school, percent)

Level of School	Quartile 1 (high-poverty schools)	Quartile 2	Quartile 3	Quartile 4 (low-poverty schools)
Elementary	73.9	49.3	34.6	16.8
Middle	66.4	44.2	31.9	16.6
High school	51.0	30.7	19.7	9.9

Source: See Table A1.

Additional information on the characteristics of the schools or students in each quartile is reported in the Appendix (Table A1). As shown there, the schools serving the more advantaged students tend to be larger than the high-poverty schools. Hence, for any level of schooling, if we were to order all students by the poverty rate in each student’s school, the median student would be in a school in the third quartile. Also shown in that table is that the average poverty rates are highly correlated with the percent of minority students across quartiles and across levels. The percentages of minorities in the high-

20. See *supra* note 17 and accompanying text.



poverty (quartile one) schools are 75.4% for elementary schools, 75.2% for middle schools, and 68.4% for high schools.

Emerging from Table 1 is clear evidence of significant polarization of students across schools by their poverty status. Table 2 shows that this polarization of schools by income is greater in 2004 than it was in earlier years. Reported in this table are the average poverty rates for quartile one and quartile four schools, where the quartiles were redefined each year, for 1995, 1999, and 2004. The table shows that the high-poverty schools have become poorer over time, both absolutely and relative to the low-poverty schools. This greater concentration over time of poor students in the high-poverty schools exacerbates the educational challenges facing those schools.

Table 2. Poverty Rates for High- and Low-Poverty Schools, by School Level for Selected Years, 1996–2004.

(weighted averages, in percent, except where noted)

	Quartile 1 (high-poverty schools)	Quartile 4 (low-poverty schools)	Difference (quartile 1 – quartile 4) percentage points
<i>Elementary Schools</i>			
1995	62.3	16.1	46.2
1999	68.2	16.9	51.3
2004	73.9	16.8	57.1
<i>Middle Schools</i>			
1995	53.9	13.5	40.4
1999	57.8	15.0	42.8
2004	66.4	16.6	49.8
<i>High Schools</i>			
1995	39.0	5.6	33.4
1999	41.8	7.2	34.6
2004	51.0	9.9	41.1

Source: Calculated by the authors using data from the North Carolina Education Research Data Center.

## II. PATTERNS OF TEACHER AND PRINCIPAL QUALITY BY POVERTY QUARTILE

The central question for this Article is how the quality of teachers and principals in high-poverty schools compares to that in low-poverty schools. Because we have no direct measure of teacher or principal quality, we rely on various indirect measures. In the case of teachers, we focus on the teacher credentials that have emerged in our previous research as statistically significant determinants of student achievement, with full recognition, however, that many other, hard-to-measure characteristics are also important determinants of

teacher quality.<sup>21</sup> For principals, we use a variety of measures that include, but are not restricted to, credentials similar to those for teachers.<sup>22</sup>

#### A. *Patterns of Teacher Qualifications*

The relevant credentials include the experience of teachers, the competitiveness of the undergraduate institutions they attended, their licensure test scores, and whether they are board-certified.<sup>23</sup> Not included in this list is the percentage of teachers who have a master's degree, because we found no evidence that a master's degree credential is associated with student achievement in North Carolina.<sup>24</sup>

*Experience.* We use as our measure of teacher experience the percentage of teachers with less than three years of experience. We measure experience in this way rather than as the average level of teacher experience in a school because our previous research shows that an additional year of experience in the earlier years of teaching has much larger effects on student achievement than does an additional year for a more experienced teacher. This focus on inexperienced teachers reflects the fact that—no matter how effective such teachers may ultimately become—their inexperience in the early years of their teaching careers typically renders them less effective than their more experienced counterparts. Other things equal, higher percentages of inexperienced teachers indicate a lower-quality teaching staff.

*Quality of Undergraduate Institution.* Available for each teacher is the name of the undergraduate institution from which he or she graduated. Following standard practice in the economics literature on teacher quality, we assign to each institution a competitive ranking

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21. Charles T. Clotfelter et al., *Teacher-Student Matching and the Assessment of Teacher Effectiveness*, 41 J. HUM. RESOURCES 789, 797–99 (2006) [hereinafter Clotfelter et al., *Teacher-Student Matching*]; Charles T. Clotfelter et al., *How and Why Do Teacher Credentials Matter for Student Achievement* 26–28 (Nat'l Bureau of Econ. Research, Working Paper No. 12828, 2007) [hereinafter Clotfelter et al., *How and Why*], available at <http://papers.nber.org/papers/w12828>. A number of studies have attempted to measure teacher quality in a way that accounts for the characteristics of teachers that are hard to measure. See Aaronson et al., *supra* note 4, at 29 (concluding that “unobservables” greatly affect teacher quality); Eric A. Hanushek et al., *Do Higher Salaries Buy Better Teachers?* 3 (Nat'l Bureau of Econ. Research, Working Paper No. 7082, 1999) (arguing that teacher salaries have only a “modest impact” on teacher mobility and student performance); Rockoff, *supra* note 4, at 247–48 (using matched student-teacher panel data in order to identify teacher fixed effects).

22. See *infra* Part II.B.

23. See Clotfelter et al., *Teacher-Student Matching*, *supra* note 21, at 797.

24. See *id.* at 799; Clotfelter et al., *How and Why*, *supra* note 21, at 27–28.

based on information for the 1997–98 freshman class from the Barron's College Admissions Selector.<sup>25</sup> Barron's reports six categories<sup>26</sup> which we aggregated to four categories: uncompetitive, competitive, very competitive, and unranked. Many of the state's teacher preparation programs are offered by state institutions in the competitive category. We use as our measure of the quality of the undergraduate institution the percentage of teachers who graduated from uncompetitive institutions. A higher percentage indicates a lower-quality teaching force.

*Licensure Type.* The State of North Carolina has many types of licenses which can be divided into three categories: regular, which includes both initial and continuing licenses; lateral entry; and "other."<sup>27</sup> Lateral-entry licenses are issued to individuals who hold at least a bachelor's degree with a minimum 2.5 cumulative G.P.A. and the equivalent of a college major in the area in which they are assigned to teach.<sup>28</sup> Such teachers must affiliate with a college or university to complete prescribed coursework.<sup>29</sup> Currently the lateral-entry licenses are issued for two years and can be renewed for a third year.<sup>30</sup> The "other" category includes a variety of provisional, temporary, and emergency licenses.<sup>31</sup> We use as our measure of teacher licensure the percentage of teachers who do not have a regular license. A higher percentage indicates a lower-quality teaching force.

*Licensure Test Scores.* Teachers in North Carolina are required to take and receive passing scores on various licensure tests in order to receive a license, with the specific tests depending on the year, the school level, or the subject.<sup>32</sup> We normalized test scores for each of

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25. See BARRON'S PROFILES OF AMERICAN COLLEGES 223–34 (Barron's Educ. Series, Inc. ed., 23d ed. 1999).

26. *Id.* at 223.

27. See DEP'T OF PUB. INSTRUCTION, N.C. STATE BD. OF EDUC., POLICY MANUAL (2006), <http://sbepolicy.dpi.state.nc.us> (follow "NCSBE Policy Manual Table of Contents" hyperlink; then follow "Quality Teachers, Administrators, and Staff" hyperlink; then follow "QP-A" hyperlink; then follow "QP-A-001" hyperlink).

28. LICENSURE SECTION, N.C. STATE BD. OF EDUC., LATERAL ENTRY: CRITERIA AND CONDITIONS 1 (2003), <http://www.ncpublicschools.org/licensure/pdfs/IS-LE.pdf>.

29. *Id.*

30. *Id.*

31. See DEP'T OF PUB. INSTRUCTION, *supra* note 27 (describing temporary and emergency licenses). Given the requirements of NCLB, as of June 30, 2006, provisional and emergency licenses are no longer being issued in "core academic subjects." North Carolina State Board of Education, SBE Highlights (Feb. 5–6, 2003), <http://www.ncpublicschools.org/sbehighlights/2003/02highlights.html>.

32. See DEP'T OF PUB. INSTRUCTION, N.C. STATE BD. OF EDUC., POLICY MANUAL (2006), <http://sbepolicy.dpi.state.nc.us> (follow "NCSBE Policy Manual Table of Contents"

the major tests separately for each year the test was administered based on means and standard deviations from test scores for all teachers in our data set so that all licensure tests have a mean of zero and a standard deviation of one. This normalization makes the scores comparable both across years and tests. For teachers with multiple test scores in their personnel files, our teacher test score variable is set equal to the average of all the scores for which we can perform the normalization. Higher average test scores indicate a higher-quality teaching staff.

*National Board Certification.* North Carolina has been a leader in the national movement to have teachers certified by the National Board for Professional Teaching Standards (“NBPTS”) and provides an incentive in the form of a 12% boost in pay for teachers to do so.<sup>33</sup> Such certification, which requires teachers to put together a portfolio and to complete a series of exercises and activities designed to test their knowledge of material for their particular field, takes well over a year. Higher percentages of NBPTS-certified teachers signify a higher-quality teaching staff.

The patterns across poverty quartiles, which are reported in Table 3, are strikingly consistent. In every case, the high-poverty schools have the highest percentages of teachers with little experience, who have graduated from less competitive undergraduate institutions, and who have nonregular licenses relative to schools in the other poverty quartiles. These higher percentages imply that the high-poverty schools have teachers with weaker average qualifications. Consistent with those patterns, average teacher test scores are also the lowest in the high-poverty schools, as are their shares of NBPTS-certified teachers.

The consistency of the patterns leaves no doubt that students in the high-poverty schools are taught by teachers with lower qualifications than those in the lower-poverty schools. Moreover, in many cases the differences are large. Consider, for example, the distribution of NBPTS-certified teachers. While 3.9% of the teachers in high-poverty high schools are NBPTS certified, more than double that percent are NBPTS-certified in the schools serving the most advantaged students.

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hyperlink; then follow “Quality Teachers, Administrators, and Staff” hyperlink; then follow “QP-A” hyperlink; then follow “QP-A-003” hyperlink).

33. Department of Public Instruction, North Carolina State Board of Education, National Board Certification, <http://www.ncpublicschools.org/recruitment/nationalboard/certification> (last visited May 3, 2007).

Table 3. Credentials of Teachers by Level of School and by Poverty Quartile, 2004.

(averages weighted by number of teachers in each school; percent except where noted)

Teacher Credential	Quartile 1 (High-poverty schools)	Quartile 2	Quartile 3	Quartile 4 (Low-poverty schools)
<i>Elementary Schools</i>				
Less than three years experience	18.7	16.2	14.8	13.3
Less competitive undergraduate institution	25.9	21.9	19.0	15.4
Non-regular license	9.6	6.4	5.0	4.8
Test scores (average)	-0.138	-0.011	0.053	0.115
Board-certified	4.7	7.2	7.8	9.9
<i>Middle Schools</i>				
Less than three years experience	24.6	19.2	15.1	13.9
Less competitive undergraduate institution	26.3	22.7	17.5	16.4
Nonregular license	23.4	15.3	10.7	10.7
Test scores (average)	-0.160	-0.056	0.026	0.061
Board-certified	3.2	4.8	7.2	9.2
<i>High Schools</i>				
Less than three years experience	17.3	15.2	13.4	14.6
Less competitive undergraduate institution	27.4	19.6	15.4	14.2
Nonregular license	20.5	17.7	14.1	13.3
Test scores (average)	-0.057	0.032	0.105	0.117
Board-certified	4.1	7.9	9.4	9.9

Source: Calculated by the authors using data from the North Carolina Education Research Data Center.

Figure 1 displays the patterns for one of the credentials—teacher test scores—across the poverty quartiles for all three levels. The figure dramatically depicts how much lower the test scores of the teachers in the high-poverty schools are relative to the average of test

scores of all teachers (denoted by zero) and relative to those of teachers in each of the higher quartiles.

These patterns are not unique to 2004. Table 4 illustrates the patterns at five-year intervals for one of the credentials—the percentage of inexperienced teachers. For simplicity, the table includes just the high- and low-poverty schools. In nearly all cases, the difference between the high- and low-poverty schools is positive, indicating that—for each year—more of the teachers in the high-poverty schools were inexperienced than in the more affluent schools.

The proportions of inexperienced teachers in high-poverty schools rose noticeably between 1995 and 1999 but then declined somewhat in the following five years—a pattern that also emerges for the more affluent schools. The net effect of these changes, as shown in the final column, is rising differentials across quartiles for the elementary and middle schools, but a more mixed trajectory at the high school level. At all three levels, however, the differences between the percentages of inexperienced teachers in the high- and low-poverty schools have increased over the ten-year period to the disadvantage of the students in the high-poverty schools.

Figure 1. Teacher Test Scores by Level of School and by Poverty Quartile, 2004.  
(proportions of a standard deviation)

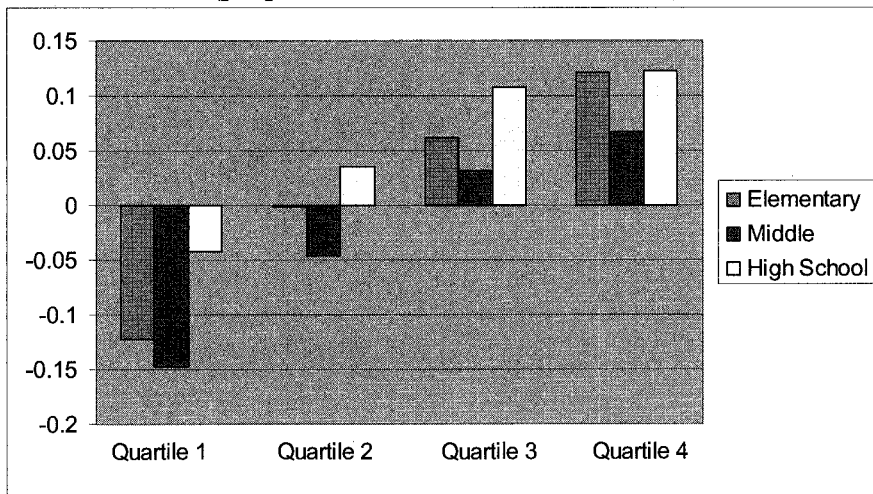


Table 4. Teachers with Less than Three Years of Experience, High- and Low-Poverty Schools, by School Level, Selected Years, 1995–2004.

(weighted average in percent, except where noted)

	Quartile 1 (high-poverty schools)	Quartile 4 (low-poverty schools)	Difference (quartile 1 – quartile 4) percentage points
<i>Elementary Schools</i>			
1995	17.4	14.5	2.9
1999	21.5	16.2	5.3
2004	18.7	13.2	5.4
<i>Middle Schools</i>			
1995	19.5	16.4	3.2
1999	26.0	18.8	7.2
2004	24.6	13.9	10.7
<i>High Schools</i>			
1995	13.4	14.0	-0.5
1999	18.7	15.5	3.2
2004	17.2	14.5	2.7

Source: Calculated by the authors using data from the North Carolina Education Research Data Center.

Note: Due to rounding, the figures in the “Difference” column may not exactly correspond to the differences of the figures in the “Quartile 1” and “Quartile 4” columns.

### B. Patterns of Principal Quality

Measuring the quality of principals is more challenging because there is no body of empirical literature comparable to that for teachers that links the measurable credentials of principals to gains in student achievement. Moreover, any relationship between the quality of principals and student achievement is less direct than that applying to teachers. Our strategy is to use a range of measures, some of which are comparable to those for teachers and others of which are more closely related to the leadership skills of the principal. The following are proxies for principal quality.

*Principal Test Scores.* Our data show that the vast majority of principals in the State of North Carolina have Praxis II<sup>34</sup> exams on record in the areas in which they taught before moving into administration. We normalized the test scores to make them comparable across years and across tests. Most of those who were licensed as teachers in the late 1980s and 1990s also have National

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34. Praxis II is an assessment that tests “knowledge of specific subjects that K–12 educators will teach, as well as general and subject-specific teaching skills and knowledge.” Praxis II Overview, <http://www.ets.org/praxis/prxaboutII.html> (last visited May 3, 2007).

Teacher's Examination ("NTE") scores on file, which we also standardized across years. Since 1997, principals have been required to pass a standardized test of basic leadership skills, the School Leaders Licensure Assessment ("SLLA").<sup>35</sup> Hence we also use these scores, in normalized form, for the principals for whom they are available.

*Competitiveness of the Principal's Undergraduate Institution.* Following the procedure we used for the teachers, we categorized the institutions using the Barron's ratings. A principal who attended a highly competitive institution might be expected to exhibit greater ambition and focus, greater intelligence, or more monetary or political resources than a principal who attended a less competitive college.

*Principal Experience.* Although we do not know when principals first became principals, we do have information on when they first were licensed as assistant principals. From that, we can calculate the years that they have been school administrators. The greater familiarity with procedures that comes with more administrative experience might be expected to make a principal more effective. Additionally, if a principal remains in administration over a long period of time, that could potentially indicate success in the job.

*Principal Leadership Rating.* In 2002 the Governor's office administered a survey of teacher working conditions ("TWC").<sup>36</sup> From the results of this extensive survey, we used factor analysis to construct a leadership factor rating for each teacher-respondent and averaged those ratings by school. The items correlating most highly with the leadership factor were those asking teachers to assess the school leader's vision for the school, responsiveness to concerns about leadership, and the general strength of leadership.<sup>37</sup> Because the survey was administered only once, it provides a measure of leadership quality just for the set of principals who were teaching in that year.

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35. See DEP'T OF PUB. INSTRUCTION, *supra* note 32.

36. See EDUC. OFFICE, OFFICE OF THE GOVERNOR OF N.C., NC TEACHER WORKING CONDITIONS SURVEY (2002), <http://www.governor.state.nc.us/Office/Education/TeacherWorkingConditionsSurvey.asp>.

37. Justin Wheeler, An Analysis of Principal Turnover, Distribution, and Effectiveness in the State of North Carolina 7, 29-30 (Apr. 21, 2006) (unpublished master's project, Duke University) (on file with the North Carolina Law Review). For more details on the construction of the leadership ratings, see *id.* The measure appears to be moderately reliable, but is not available for all schools because of nonresponse. Moreover, average leadership ratings differed systematically by the characteristics of the school. *Id.*



The patterns across poverty quartiles for all levels in 2004 are reported in Table 5. Included with each entry is the number of principals in the sample. These sample sizes differ because of missing data for large numbers of principals for some of the measures. The data are most complete for the Praxis II scores, tenure in the school, and the two measures of the undergraduate college. For all but the last row, higher numbers represent higher quality.

Table 5. Proxies for Principal Quality by Poverty Quartile, All Levels, 2004.

(weighted averages, sample sizes in parentheses)

	Quartile 1 (high-poverty schools)	Quartile 2	Quartile 3	Quartile 4 (low-poverty schools)
Praxis score	-0.29 (465)	0.08 (487)	0.18 (500)	0.21 (435)
NTE score	-0.37 (284)	-0.04 (322)	0.13 (332)	0.26 (283)
SLLA score	-0.14 (94)	0.23 (89)	0.55 (87)	0.14 (52)
Leadership rating	-0.19 (216)	0.04 (232)	0.05 (260)	0.05 (227)
Tenure in the school (years)	3.74 (480)	4.08 (505)	4.00 (514)	4.20 (444)
Competitive undergraduate institution (proportion)	0.13 (469)	0.17 (497)	0.18 (505)	0.23 (433)
Less competitive undergraduate institution (proportion)	0.35 (469)	0.27 (497)	0.19 (505)	0.19 (433)

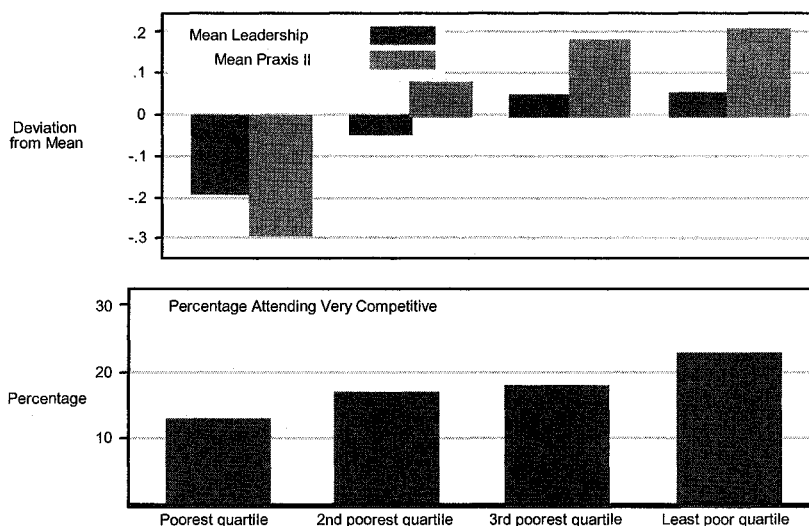
Source: Calculated by the authors using data from the North Carolina Education Research Center.

Despite the differing sample sizes and nature of the measures, the patterns are very consistent across poverty quartiles. For the three test measures at the top of the table, the average test scores in the high-poverty schools are below the statewide average of zero. That is also true for the leadership rating. The comparable measures in the low-poverty schools are all higher—with the difference ranging from about 0.3 to 0.5 standard deviations. The only difference that is not statistically significant across the quartiles is the principal's tenure at the school. The final two rows show that the principals in high-poverty schools are less likely to have attended a competitive undergraduate institution and more likely to have come from a less competitive institution. Thus, regardless of the measure used, the principals in the high-poverty schools consistently score worse on

these numerical quality measures than those in the more affluent schools.

The patterns for three of the measures are shown in Figure 2. As we show later, the distribution across quartiles for these three measures for the sub-sample of new principals is similar to this distribution.

Figure 2. Qualifications of All Principals Across Schools, Grouped by Quartile of Student Poverty, All Levels, 2004.



### III. EXPLAINING THE PATTERNS

Much has been written about why such patterns emerge for teachers, but less has been written for principals.<sup>38</sup> The main story for teachers is based on the normal functioning of teacher labor markets.

38. See, e.g., Clotfelter et al., *supra* note 1, at 381–85; Lankford et al., *supra* note 1, at 53–55. See generally BETTS ET AL., *supra* note 1, at iv (concluding “that schools with larger populations of economically disadvantaged students have fewer teaching resources” and “that differences in the socioeconomic background of students explain most of the variation in student achievement”).

### A. *Teacher Turnover and Movement*

One part of the story is what happens within districts. Teachers presumably care about both money and working conditions when they are making employment decisions, and among the factors that can affect working conditions are the characteristics of a school's students. To the extent that low-income students come to school less ready to learn and with weaker educational support at home than those from more advantaged backgrounds, teachers may well perceive that schools with large proportions of students from poor families offer harsher working environments than those schools serving more advantaged students. This perception, combined with the fact that teacher salary schedules are usually uniform within each district, implies that teachers tend to prefer to teach in schools serving more advantaged students than in schools with large proportions of low-income students.<sup>39</sup> Thus, within a district, there is a tendency to trade up—that is, for existing teachers to transfer out of the high-poverty schools and to move to the more advantaged schools. The potential for them to do so will vary across districts depending on the openings in the more advantaged schools and the nature of the internal transfer policy. In most cases, teachers within the system are given priority over new teachers when openings arise.<sup>40</sup> As a result of these policies, any new teachers that the district hires are more likely to end up in the high-poverty schools where there are openings. To the extent that the new hires are novice teachers, the effect is to put the least experienced teachers in the schools with the harshest working conditions.

The story across districts is similar except for the role of salary differentials. Even though North Carolina has a single statewide teacher salary schedule, the addition of discretionary salary supplements at the local level means that salary schedules differ across school districts.<sup>41</sup> To the extent that teachers are sufficiently

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39. A recent careful analysis of teacher turnover in Georgia confirms the greater tendency of teachers to leave high-poverty schools than other schools. See Benjamin P. Scafidi et al., *Race, Poverty, and Teacher Mobility*, ECON. OF EDUC. REV. (forthcoming 2007 or 2008) (manuscript at 6, on file with the North Carolina Law Review). The authors conclude, however, that the driving force is the race of the students in those schools rather than their poverty status. See *id.* at 2–3.

40. This unwritten procedure emerged clearly from a series of informal case studies of school district personnel policies in North Carolina undertaken by the authors in 2000 and 2001.

41. Teach4NC.org, Frequently Asked Questions, <http://teach4nc.org/faqs/#salaries> (last visited May 3, 2007). For state salary schedules, local salary supplements, and the state salary manual, see Public Schools of North Carolina, Salary Guides, <http://www.nc>

mobile to have options in more than one district, we would expect them to move away from lower-paying districts in favor of more generous districts—all other factors, including working conditions, held constant.

Tables 6, 7, and 8 provide evidence in support of various parts of this standard story. Table 6 reports turnover rates—defined as the number of new teachers as a percentage of all teachers in each school—and the percentages of the newly hired teachers who have no experience, by poverty quartile. At all three levels, the patterns are as predicted: the high-poverty schools have higher turnover rates and higher proportions of novice teachers. The differences across poverty quartiles are particularly large at the middle school level. In those schools, the turnover rate of 26.6% in the high-poverty schools exceeds that in the low-poverty schools by more than 40%. Further, more than one-third of the newly hired middle school teachers have no experience. Once again these patterns are not unique to 2004. The patterns are essentially similar for every year from 1996 to 2004, with both the turnover rate and the percentage of new hires who are novice teachers almost always highest at the middle school level. (Data by year are not shown.)

By defining turnover as the proportion of teachers who are new to a school in a given year, in some cases we may be confounding turnover with enrollment growth. A school experiencing rapid growth in enrollment, and hence hiring many new teachers, for example, will appear to have high turnover rates in our analysis, even if very few of the teachers working in that school depart in a given year. Thus, to the extent that rapidly growing schools tend to be located in more affluent, growing communities, the pattern in Table 6 may understate disparities in true turnover rates.<sup>42</sup>

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publicschools.org/fbs/finance/salary (last visited May 3, 2007). The state salary manual dictates the state-level salary schedules, and each local school district can determine their own supplements. *Id.*

42. An alternative to the analysis in Table 6 would examine the frequency of departures from a school. In previous work, we have used departures as a measure of turnover. Just as arrivals data confound turnover with growth, however, departure data confound turnover with enrollment decline. We have chosen to present the results in Table 6 so as not to overstate the differences. See Charles T. Clotfelter et al., *Do School Accountability Systems Make It More Difficult for Low-Performing Schools To Attract and Retain High-Quality Teachers?*, 23 J. POL'Y ANALYSIS & MGMT. 251, 256–58 (2004) [hereinafter Clotfelter et al., *School Accountability Systems*]; Charles Clotfelter et al., *Would Higher Salaries Keep Teachers in High-Poverty Schools? Evidence from a Policy Intervention in North Carolina* 10 (Nat'l Bureau of Econ. Research, Working Paper No. 12285, 2006) [hereinafter Clotfelter et al., *Higher Salaries*], available at <http://papers.nber.org/papers/w12285>.

Table 6. Teacher Turnover Rates and Percentages of Novice Teachers by Level, 2004.  
(weighted averages, percent)

	Quartile 1 (high-poverty schools)	Quartile 2	Quartile 3	Quartile 4 (low-poverty schools)
<i>Elementary Schools</i>				
Turnover rate	23.0	20.1	19.4	18.8
Novice teachers as a % of new hires	30.7	30.7	30.6	25.2
<i>Middle Schools</i>				
Turnover rate	26.6	22.8	20.2	18.5
Novice teachers as a % of new hires	35.2	34.8	31.1	26.1
<i>High Schools</i>				
Turnover rate	23.5	19.7	18.7	21.1
Novice teachers as a % of new hires	35.0	31.9	29.3	26.1

Source: Calculated by the authors using data from the North Carolina Education Research Center.

The high rates of teacher turnover in the high-poverty schools not only help explain the patterns we described in Part II above but also exert their own harmful effects. High turnover rates are disruptive and make it difficult for schools to develop coherent educational programs and to provide consistent programming from one year to the next.

Table 7 illustrates the movement of elementary school teachers over the period 1999 to 2004. The first row for each level of schooling is the number of teachers in each poverty quartile in 1999, and subsequent rows show the percentages of the original number who were in the same school, who transferred to another school in the same district, who transferred to another school in a different district, and who were no longer in the data set, either because they left the state, moved out of the public school system, or left teaching.

Table 7. Movement of Teachers by Initial Poverty Quartile,  
Elementary Schools, 1999–2004.  
(percentage of 1999 number, except as indicated)

	Quartile 1 (high-poverty schools)	Quartile 2	Quartile 3	Quartile 4 (low-poverty schools)
Teachers in 1999 with 0–5 years of experience (number)	3,132	2,988	2,953	3,142
Stayed in same school	27.0	30.2	33.9	34.0
Moved to a school in same local educational authority	17.9	18.7	17.9	16.4
Moved to a school in different district	16.4	12.6	11.2	9.7
Out of data set or left teaching	38.7	38.6	37.1	39.9

The patterns are generally consistent with expectations. Of most interest are the differences across quartiles in the percentages of teachers who stayed in the same school and those who moved to a different district. Consistent with the pattern of turnover rates described above, only about 27% of the teachers in the high-poverty schools were still in the same school five years later, in contrast to 34% in the more affluent schools. Among those who stayed in the state but moved to a different school, a far greater proportion in the high-poverty schools moved to a different district, presumably as a way either to increase their salary or to improve their working conditions.<sup>43</sup>

Not shown in the table are the patterns for middle and high school teachers. At the middle school level, the percentage of teachers who remained in the same schools for five years was only 22.2% in high-poverty schools, in contrast to 31% in the more affluent schools. Across quartiles of high schools the percentages who remained ranged from 26.5% to 37%.

Among the teachers who change schools, we predict that the moves on average improve their working conditions, as reflected by a reduction in the percentages of low-income students in the school.

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43. In future work, we plan to investigate these moves in more detail.

Table 8 indicates that that is the case, and especially so for the teachers moving from high-poverty schools. We show the percent of poor students in the initial schools and the new schools for all teachers who changed schools between 1999 and 2004, by level of school and also for the subset of movers who started in high-poverty schools. As shown in the final column, at the elementary and middle school levels, the typical teacher who moved ended up in a school with a slightly lower poverty rate, but that was not true for the typical mover at the high school level. Shifting the focus to teachers who started out in high-poverty schools, we see that teachers at all three levels moved to schools with far lower rates of poverty. Poverty rates in the new schools averaged 22.5 percentage points lower for elementary school movers, 18.3 points lower for middle school movers, and 13.9 points lower for high school movers.

Table 8. Poverty Rates in Old and New Schools for Teachers Who Changed Schools During the Period Between 1999 and 2004, by Level of School for All Teachers Who Changed Schools and for the Subsets of Teachers Who Moved from High-Poverty Schools.

(Percent, except where noted)

School Level	Poverty Rate in Old School	Poverty Rate in New School	Difference New vs. Old (percentage points)
Elementary—all	38.1	36.8	-1.3
Elementary—high-poverty	67.1	44.6	-22.5
Middle—all	30.7	29.2	-1.5
Middle—high-poverty	56.6	38.3	-18.3
High school—all	17.6	18.2	0.7
High school—high-poverty	38.3	24.4	-13.9

Source: Calculated by the authors using data from the North Carolina Education Research Center.

In additional analysis not shown here, we calculated similar figures for teachers in each of the state's five largest districts who moved from one school to another, but stayed within the same district. In each case, we defined high-poverty schools relative to other schools in the district, rather than to the state as a whole. For three of the five districts—Forsyth County, Guilford County, and Mecklenburg County—the average reduction in the school poverty rate experienced by elementary teachers who moved away from schools that were defined as high-poverty within the district exceeded

the 22.5% average reduction for all such moves in the state. The average reductions were 27.4% in Forsyth, 30.8% in Guilford, and 26.4% in Mecklenburg. In Cumberland County, the average reduction mirrored that for the state. Only in Wake County was the reduction smaller at only 11.5 percentage points. This smaller figure for Wake largely reflects that county's effort to balance the socioeconomic mix of students across schools.<sup>44</sup> As a result, the high-poverty schools in that county—that is, those in the first quartile—had an average poverty rate of only 44.2%, far lower than the average rates above 75% for the first quartile in each of the other large districts. Even in that county, however, teachers who started out in relatively high-poverty schools moved to those with lower rates of poverty.

This tendency of teachers to move away from schools with high rates of poverty to those with lower rates of poverty—either by moving within a district or by moving to a school in another district—is thus an important part of the explanation for the inequities across poverty quartiles depicted earlier.

Two other factors are also worth noting. The first is the finding from research in New York State that teachers prefer to teach close to where they grew up or in schools similar to the ones they attended. In that state, more than three out of five teachers who began their teaching careers between 1999 and 2002 started teaching in a district within fifteen miles of the district in which they attended high school and five out of six started teaching within forty miles.<sup>45</sup> This preference to return home can make it hard for schools in some large urban areas and some rural areas to attract teachers.<sup>46</sup> Moreover, to the extent that prospective teachers in those areas were educated in low-quality high schools, schools in those areas may end up hiring teachers from a pool of applicants that have relatively weak qualifications.<sup>47</sup>

The second is evidence from North Carolina that the State's ABCs accountability program has exacerbated the challenge that low-performing schools, many of which are likely to be high-poverty

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44. See Sara Rimer, *Schools Try Integration by Income, Not Race*, N.Y. TIMES, May 8, 2003, at A1 (highlighting Wake County's socioeconomic integration program).

45. SUSANNA LOEB & MICHELLE REININGER, PUBLIC POLICY AND TEACHER LABOR MARKETS: WHAT WE KNOW AND WHY IT MATTERS 48 (2004), available at <http://www.epc.msu.edu/publications/publications.htm>.

46. *Id.*

47. See *id.* at 49–50 (noting particularly the problems urban areas face in retaining teachers).



schools, face in retaining teachers.<sup>48</sup> That outcome occurs because the accountability system gives teachers yet another incentive to leave the high-poverty, low-performing schools: the higher probability of receiving a financial bonus that comes with being a successful school and the negative effect of being in a school that is publicly identified as failing to meet the needs of its students.<sup>49</sup>

### *B. Principal Turnover and Movement*

Many of the labor market dynamics that apply to teachers are likely to apply to principals as well. Other considerations, however, are also relevant. In many cases principals may advance into the principalship from the schools or districts in which they have taught.<sup>50</sup> Policies that permit principals to retain their career status as teachers only within the districts where they received tenure may create a disincentive for them to move across districts.<sup>51</sup> Thus the presence of less qualified principals in the high-poverty schools may simply reflect the presence of less qualified teachers in those schools. In addition, principals are under the scrutiny of the district and the public to a much higher degree than teachers and are more likely to be held individually accountable for school performance.<sup>52</sup> As a result they may be more likely than teachers to leave the principalship or move to another school under duress or at the behest of a superintendent. This public scrutiny and accountability for student achievement could well result in higher turnover of principals in high-poverty schools, and also higher rates than before accountability pressures became widespread.<sup>53</sup> Whether it leads to higher- or lower- quality principals in such schools is hard to predict since that depends on the extent to which the district policymakers are committed to improving the quality of the leadership in those schools.

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48. *Id.* at 50.

49. See generally Clotfelter et al., *School Accountability Systems*, *supra* note 42.

50. *Id.* at 255.

51. See, e.g., SUSAN M. GATES ET AL., CAREER PATHS OF SCHOOL ADMINISTRATORS IN NORTH CAROLINA: INSIGHTS FROM AN ANALYSIS OF STATE DATA (2004), available at [http://www.rand.org/pubs/technical\\_reports/2005/RAND\\_TR129.pdf](http://www.rand.org/pubs/technical_reports/2005/RAND_TR129.pdf).

52. See, e.g., FRANK C. PAPA, JR. ET AL., THE ATTRIBUTES AND CAREER PATHS OF PRINCIPALS: IMPLICATIONS FOR IMPROVING POLICY 1 (2002), available at [http://www.emsc.nysed.gov/csl/resources/Attributes\\_of\\_Principals.pdf](http://www.emsc.nysed.gov/csl/resources/Attributes_of_Principals.pdf) (noting the multiplicity of roles played by principals, including “represent[ing] the school with a variety of external audiences regarding performance, resources, and community relations”).

53. GATES ET AL., *supra* note 51, at 65–66 (noting that principal turnover is greater at schools with a higher proportion of minority students than at schools in wealthier counties).

Figures 3 and 4 provide some insight into the patterns of principal turnover and movement. As in previous tables and figures, averages are weighted by school size unless otherwise noted. Ultimately, they suggest that these patterns are largely in keeping with those observed among teachers.

Figure 3 shows principal turnover rates by poverty quartile from 1996 to 2004. Though turnover rates vary considerably across years and poverty quartiles, the high-poverty schools exhibit the highest turnover in all years except 2004. Moreover, as we predicted, the turnover rates of principals in these schools have been higher since the introduction of the State's accountability system in the 1996–97 school year than in the years 1996 and 1997. Further exacerbating the challenges of the schools serving poor students is that the new principals they receive are more likely to be new to the principalship. Over the period of analysis, 66.6% of principals new to a school in which the majority of students are poor are novice principals; the equivalent figure for schools without a majority of poor students is 60.3%.<sup>54</sup>

A comparison by poverty quartile of the characteristics of the novice principals strongly suggests that principal sorting is largely a result of patterns of entry into the principalship. Figure 4 portrays the distribution of principal qualifications across quartiles of student poverty as shown earlier in Figure 2, but now for novice principals rather than all principals. The patterns are similar in the two figures. As shown here, the new principals in schools with the highest poverty once again have the lowest test scores and leadership ratings and have attended competitive colleges at significantly lower rates. To the extent that principals tend to rise to the assistant principalship from teaching positions and later, to the principalships within the same school, this unequal distribution of new principals may well be attributable to teacher sorting.

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54. The difference in first-time principals across majority poor and minority poor schools is statistically significant at the 0.01 level. The percentages presented are not weighted in this case.

Figure 3. Principal Turnover Rates in Schools by Quartile of Student Poverty, All Levels, 1996–2004.

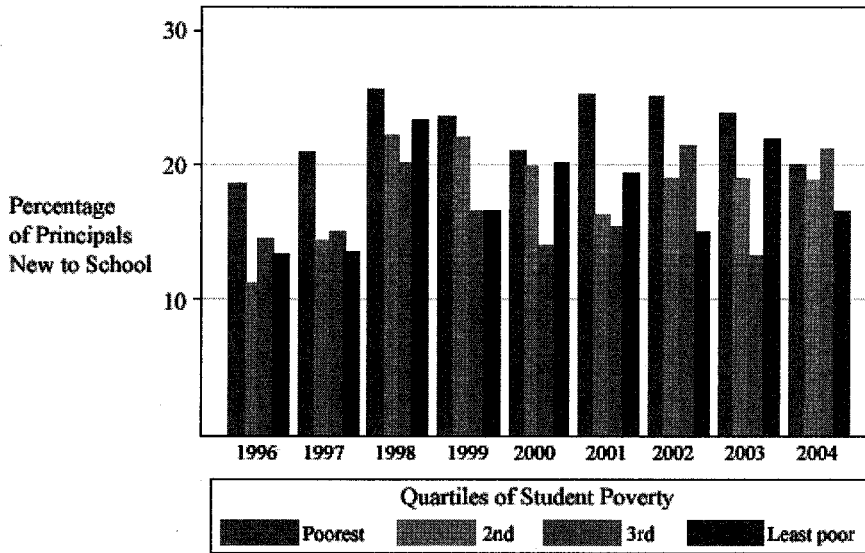
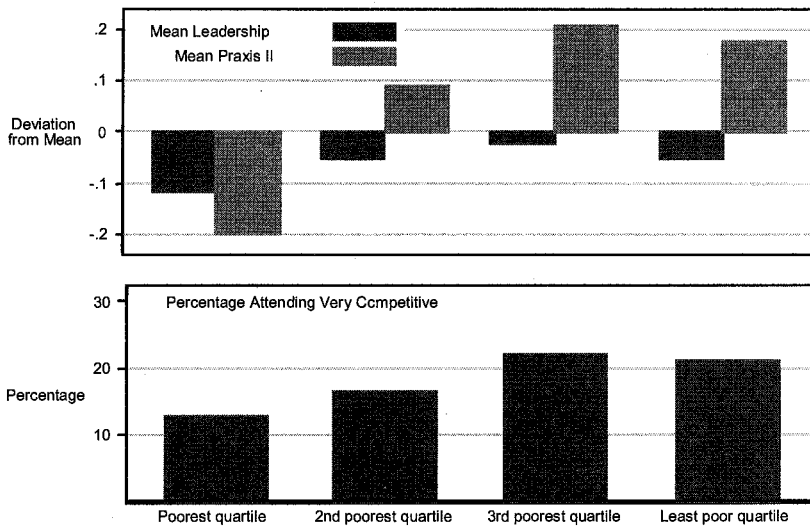


Figure 4. Qualifications of New Principals Across Schools by Poverty Quartile, All Levels.



Finally, Table 9 illustrates the relationship between student poverty and the movement of principals between schools. The first two rows show that principals leaving elementary and middle schools moved into schools of the same level with student poverty rates, on average, 5.0 and 7.1 percentage points lower than at their schools of origin. Both these differences are statistically significant, as is the 4.8 percentage point difference across all schools. Only for high schools does this pattern not hold.<sup>55</sup>

Table 9. Poverty Rates in Old and New Schools for Principals Who Changed Schools Between 1996 and 2004.  
(percent except where noted)

School Level	Sample Size (Number)	Poverty Rate in Old School	Poverty Rate in New School	Difference New vs. Old (percentage points)	P-value
Elementary	328	48.7	43.7	-5.0	0.00
Middle	47	41.8	34.6	-7.1	0.01
High	34	22.1	22.8	+0.7	0.81
All levels	409	45.7	40.9	-4.8	0.00

Note: Full sample includes all principal moves from FY1996 through FY2006 in which the school of origin and recipient school were of the same level. School poverty measure for both school of origin and new school are for the year prior to the principal's move.

#### IV. DISCUSSION AND POLICY IMPLICATIONS

The main purpose of this Article is to document the extent to which the qualifications of the teachers and principals in high-poverty schools fall short of those in more affluent schools in North Carolina and to provide some sense of why those patterns emerge. For anyone familiar with schools and the operation of teacher labor markets, the emergence of these shortfalls should come as no surprise.<sup>56</sup> Nonetheless, the consistency of the findings across all credentials for both principals and teachers and over time is remarkable and quite striking. Given the consistency of the patterns for the credentials that we were able to measure, it is reasonable to assume that similar patterns might well emerge for many other unmeasured credentials.

By the input standard of equal educational opportunity that we referred to in the Introduction, we conclude that the inequities with respect to the distribution of teacher and principal qualifications are

55. The sample of high school to high school and middle school to middle school principal moves are small, in part, because the majority of principals leaving high schools and middle schools move to schools of another level (62% and 63%, respectively).

56. See *supra* Part III.A.

large in North Carolina and that they clearly work to the disadvantage of the students in the high-poverty schools. In addition, such differences raise questions about where blame should be placed for the failure of such schools to raise student achievement to the desired levels. Although some of the high-poverty schools could undoubtedly put the resources they have to better use, this study highlights the more systemic problem that such schools face, namely that given the way the teacher and principal labor markets work it is difficult for them to attract and retain high-quality teachers and principals. Thus, if policymakers are serious about improving high-poverty schools, they will have to alter the way the labor markets for teachers and principals work in order to make high-poverty schools more competitive.

Before turning to one approach for moving in that direction, we briefly summarize the evidence from our previous research on how the credentials of teachers and principals affect student achievement.

#### A. *Teacher Credentials and Student Achievement*

Determining the causal relationship between teacher credentials and student achievement is a challenge, in part, because of the patterns we have documented in this Article—namely, that teachers with the strongest credentials gravitate toward the schools with the most advantage and the higher achievement. Without careful attention to the way teachers and students are matched—not only across schools but also across classrooms within schools—it is difficult to isolate the causal effect of credentials on student achievement. Using the rich administrative data on students and teachers for North Carolina that permits the matching of student and teacher records over time, we have been able to make progress in estimating true causal relationships, at least at the elementary level.<sup>57</sup>

Our findings related to the credentials described earlier are illustrated in Table 10. This table compares how the estimated effects on student achievement differ between a baseline teacher with the credentials listed in the first column and a teacher with the weaker credentials shown in the second column. The illustrative baseline teacher is assumed to have ten years of experience, to have graduated from a competitive college, to hold a regular license, and to have obtained an average score on her licensure tests. In addition, she is National Board-certified. The illustrative teacher with weaker

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57. See, e.g., Clotfelter et al., *Higher Salaries*, *supra* note 42; Clotfelter et al., *Teacher-Student Matching*, *supra* note 21.

credentials is a novice teacher, graduated from an uncompetitive college, has a test score one standard deviation below average and is not board-certified. For both math and reading the table reports two sets of estimated average effects. These results emerge from two versions of a carefully specified model designed to explain variations in student achievement in grades four and five, and we interpret them as lower- and upper-bound estimates of the true effects of the credentials.<sup>58</sup>

Emerging from the table is that the average effect on a student's achievement in math of having a teacher with the weaker set of credentials is negative and of the order of 0.15 to 0.20 standard deviations. The effects for reading are also negative but somewhat smaller in magnitude. As we have shown in our prior research, the negative effects associated with having a teacher with poor credentials are clearly detrimental to student achievement but are not as harmful as having poorly educated parents.<sup>59</sup> In contrast, the negative effects of having a teacher with weak credentials in math are generally comparable in size to those associated with having poorly educated parents.<sup>60</sup> Hence the effects are large and very relevant for policy.

The estimates in Table 10 are only illustrative and overstate the differential effects across types of schools, given that no school has all strong or all weak teachers. Nonetheless, we report them here to emphasize that the patterns described in Part II, which consistently document the weaker credentials of teachers in the high-poverty schools relative to those in the more affluent schools, adversely affect the achievement of the students in the high-poverty schools. Moreover, the adverse effects would cumulate over all the years a student attended a high-poverty school.

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58. See Clotfelter et al., *Teacher-Student Matching*, *supra* note 21; Clotfelter et al., *How and Why*, *supra* note 21.

59. Clotfelter et al., *How and Why*, *supra* note 21, at 31, 39.

60. *Id.* at 31.

Table 10. Effects on Achievement: Subject Teacher vs. Baseline Teacher.

Baseline Teacher	Subject Teacher (Weak Credentials)	Difference in achievement (lower- and upper-bound estimates)			
		Math		Reading	
		low	high	low	high
Ten years of experience	No experience	-0.079	-0.094	-0.053	-0.072
Competitive undergraduate college	Noncompetitive undergraduate college	-0.007	-0.010	*	*
Regular license	Other license	-0.033	-0.059	-0.017	-0.024
Licensure test score is average	Licensure test is 1 SD below the average	-0.011	-0.015	-0.003	-0.004
National Board-certified	Not National Board-certified	-0.020	-0.028	-0.012	-0.012
Total difference		-0.150	-0.206	0.085	-0.112

\* signifies coefficient is not statistically significant

Source: Clotfelter et al., Teacher-Student Matching, *supra* note 21.

### B. Principal Qualifications and Student Achievement

Though common sense suggests that the differences across poverty quartiles in the qualifications of principals matter for the success of the school, whatever implications they have for student achievement are indirect and hard to measure. Nonetheless, in prior research, one of us has found support for the conclusion that differences in some of our measures of principal quality matter.<sup>61</sup> That evidence is of two types: evidence that principals with better credentials generate better schoolwide outcomes as measured by the percentage of students who reach proficiency (based on state standards) and evidence that such principals are more successful in attracting and retaining high-quality teachers than is the case for principals with weaker qualifications.<sup>62</sup>

The evidence emerges from analyses that take into account the fact that principals with better qualifications tend to select into schools with higher-performing students and higher-quality teachers.<sup>63</sup> Failure to account for this sorting process would generate estimates that overstate the causal impact of principals since part of any measured relationship would simply reflect the sorting process. In particular, we identify the effects of principals with the use of empirical models that control statistically for both the observed and

61. See Wheeler, *supra* note 37, at 19–23.

62. See *id.*

63. *Id.* at 14.

unobserved characteristics of the schools.<sup>64</sup> In effect, we identify the effects of principals by the movements of principals with differing characteristics into and out of schools, with attention to the time the principal stays in a school. In this way, it is possible to isolate the causal effects of principal credentials on outcomes rather than simply the correlations.

Among the results are the following. A principal's leadership rating appears to have statistically significant positive, but relatively modest, effects on the proportions of students who are proficient in primary schools and high schools, though not in middle schools. All other factors held constant, the percentage of students who are proficient would be about five percentage points higher in a high school run by a principal with a very high leadership rating than in a comparable high school run by a principal with a very low leadership rating.<sup>65</sup> In addition, having attended a competitive college rather than an uncompetitive college is associated with a marginally significant positive effect on student proficiency at both the middle and high school levels.

In addition, the analysis indicates that one of the mechanisms by which highly rated principals with longer tenure in their schools improve student achievement is through their ability to reduce teacher turnover and to staff their schools with more qualified teachers. The results indicate that principals with moderately high leadership ratings reduce teacher turnover rates by about 2.6 percentage points compared to principals with average leadership ratings in elementary schools.<sup>66</sup> In addition, an additional year of tenure in a school predicts a reduction of teacher turnover at all three levels of schooling.<sup>67</sup> Finally, higher principal leadership ratings are associated with the ability to attract stronger teachers as measured by their test scores and by their experience as a teacher.<sup>68</sup>

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64. The technical term for these models are fixed effects models, where the fixed effects of each school are captured by 0–1 indicator variables for each school.

65. Wheeler, *supra* note 37, at 22. This analysis was restricted to the principals for whom leadership ratings were available and assumed that the 2002 leadership ratings applied to the principal in other years.

66. *Id.* at 23.

67. While one might expect an effective new principal's first year or two to be associated with higher turnover of teachers as he or she pushes out teachers perceived to be ineffective, Wheeler finds no evidence of that type of "cleaning house." *Id.*

68. *Id.* at 24.



### C. Policy Considerations

To counter the strong economic forces that generate the disparities in teacher and principal credentials across schools, new policy strategies will need to be developed. One approach might be to try to increase the overall supply of quality teachers in the state, with the hope that a larger supply will ease the problems faced by the high-poverty schools.<sup>69</sup> An alternative approach would focus directly on making it more attractive for teachers to teach in high-poverty schools. Though a full discussion of policy strategies is beyond the scope of this Article, we briefly describe one possible policy option that has been informed by our previous research.

As evidenced by the movement of both teachers and principals away from high-poverty schools, it is clear that teachers and principals find the combination of compensation and working conditions in such schools less attractive than that available in more affluent schools. Thus, it seems reasonable to consider policies designed either to improve the working conditions or to raise the salaries available in high-poverty schools. Although there is debate in the literature regarding the power of higher salaries to convince teachers to work in high-poverty schools,<sup>70</sup> our previous research suggests that modest targeted increases in salary can reduce turnover rates in such schools.<sup>71</sup> In that study, we measured the impact of a short-lived North Carolina program that paid an annual bonus of \$1,800 to certified math, science, and special education teachers in high-poverty or low-performing middle and high schools.<sup>72</sup> Importantly, the bonus was not designed as a one-time bonus but rather as one that would continue as long as an eligible teacher continued to teach in a school that was eligible. Based on comparisons of the behavior of bonus-eligible teachers to ineligible teachers in the same school, or in schools that barely missed the criteria for participation in the program, we concluded that the bonus generated a 12% decrease in turnover rates among the affected

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69. For a discussion of this supply-oriented strategy in the North Carolina context, see generally Dana Damico, *The Shortage of Teachers in North Carolina: Can We Attract and Retain Enough?*, N.C. INSIGHT, Aug. 2004, at 2.

70. See, e.g., Hanushek et al., *supra* note 21, at 43 (arguing that teacher salaries have only a modest impact on teacher mobility and student performance).

71. See Clotfelter et al., *Higher Salaries*, *supra* note 42, at 13.

72. *Id.*

teachers.<sup>73</sup> Moreover, this positive outcome emerged despite various problems associated with the implementation of the program.<sup>74</sup>

More experimentation and evaluation of this and other strategies are clearly needed if good policies are to be developed to address the significant inequities described in this Article.

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73. *Id.* at 4.

74. *Id.* at 21.

## APPENDIX

Table A1. Descriptive Information by Poverty Quartile and by Level of School, 2004 (all averages are weighted by the number of students in each school).

	Quartile 1	Quartile 2	Quartile 3	Quartile 4
<i>Elementary Schools</i>				
# of Schools	344	344	344	344
# of Students	143,420	161,225	171,123	190,557
% of Students	21.5%	24.2%	25.7%	28.6%
Avg. School Size	490.9	538.1	574.7	669.6
Avg. Percent Poor	73.9%	49.3%	34.6%	16.8%
Avg. Percent Minority	75.4%	46.4%	30.8%	23.9%
% Schools in West N.C.	8.4%	29.1%	37.8%	19.5%
% Schools in Central N.C.	71.5%	53.8%	47.1%	71.5%
% Schools in East N.C.	20.1%	17.2%	15.1%	9.0%
<i>Middle Schools</i>				
# of Schools	112	113	113	113
# of Students	60,264	79,991	81,080	84,086
% of Students	19.7%	26.2%	26.5%	27.5%
Avg. School Size	657.4	787.7	791.8	895.7
Avg. Percent Poor	66.4%	44.2%	31.9%	16.6%
Avg. Percent Minority	75.2%	48.1%	31.6%	23.4%
% Schools in West N.C.	2.7%	23.9%	37.2%	21.2%
% Schools in Central N.C.	72.3%	53.1%	45.1%	68.1%
% Schools in East N.C.	25.0%	23.0%	17.7%	10.6%
<i>High Schools</i>				
# of Schools	102	102	102	102
# of Students	65,881	108,295	123,453	88,843
% of Students	17.0%	28.0%	31.9%	23.0%
Avg. School Size	1,018.7	1,285.7	1,391.6	1,465.8
Avg. Percent Poor	51.0%	30.7%	19.7%	9.9%
Avg. Percent Minority	68.4%	44.9%	29.2%	21.7%
% Schools in West N.C.	6.9%	26.5%	40.2%	19.6%
% Schools in Central N.C.	63.7%	49.0%	44.1%	67.6%
% Schools in East N.C.	29.4%	24.5%	15.7%	12.7%

Source: Calculated by the authors with data from the North Carolina Education Research Data Center.