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Sanford Working Paper Series
SAN06-08
December 2006

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Abstract

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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Revised December 7, 2006.

Keywords: Education, High-Poverty Schools, Teacher Labor Markets, Teacher Mobility, Teacher Qualifications

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This is a revised version of a paper prepared for the UNC Conference on High Poverty Schooling in America, Chapel Hill, N.C., October 13, 2006. The conference was sponsored by the *North Carolina Law Review*, the UNC Center for Civil Rights, the UNC Center on Poverty, Work and Opportunity and the UNC School of Education. The authors are grateful to Aaron Hedlund for excellent research assistance and to the Spencer Foundation for financial support.

Many previous studies and policy debates have focused attention on resource disparities in schooling. During more than 30 years of school finance court cases, for example, lawyers and policy makers have objected to wealth-related disparities across school districts in per pupil spending. Further, in the context of civil rights debates, researchers and policy makers have examined disparities in the resources available to students of different races. Though informed by those debates, this study differs by its focus on schools rather than districts as the unit of observation, and on poverty rather than race as the key variable of interest. It also differs by its 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, 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. Teachers are crucial given their daily contact with students in the classroom. [1] The effect of school principals is less direct but nonetheless important. Effective school principals are able to provide school environments more conducive to learning and may be more successful than their less effective peers in attracting, supporting, and retaining high quality teachers (Leithwood et al, 2004).

[1] A number of recent empirical studies document the importance of teachers. 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. (Rivkin, Hanushek and Kain, 2005; Rockoff 2004, and Aronson, Barrow and Sanders, 2003).

Given the importance of teachers and principals, the central question for this paper 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. Second, it bears on the operation of school-based accountability systems designed to put pressure on school personnel to improve student achievement.

Equal educational opportunity requires that the quality of schooling provided to students be similar across schools. 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. Note that this input standard of social justice is far less demanding than a 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.

The weaker standard of input equality is more straightforward and departures from it are easier to quantify than is the case with the more ambitious outcome standard. Moreover the outcome standard raises some thorny issues about the extent to which schooling alone can and should be expected to offset the adverse effects of economic or other disadvantages [2] In any case departures from equity defined in terms of the equality

[2] Objections have been raised on both philosophical and on practical grounds. For an example of the philosophical objections, see Amy Guttman's discussion of why equal opportunity defined in terms of outcomes at the level of the individual student is too ambitious an equity standard. That line of argument leads her in the direction of adequacy and the concept of the threshold level of education necessary to

of educational inputs may be interpreted as minimum bound estimates of departures from the more ambitious outcome standard.

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 (NCLB) legislation. Implicit in discussions of these current state and federal efforts to hold individual schools accountable for student achievement is often the view that all schools have equal capacity to perform well and that they will do so if they are given the right incentives. To the extent that the labor market for teachers and principals works to the disadvantage of the high poverty schools, however, that view could be both counterproductive and unfair to the teachers and principals in those schools.

The empirical analysis in this paper is based on rich administrative data on teachers and school administrators in North Carolina provided by the North Carolina Department of Public Instructions 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 (2002) for New York and Betts, Reuben, and Danenberg (2000) for California, find, as we do, that students attending high poverty schools have access to teachers with weaker qualifications than their counterparts attending schools serving more advantaged students. 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 states highlights the importance of strong economic and other

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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 (Rothstein, 2004).

forces that transcend state policy differences. Far less well studied and documented for other states are patterns related to school principals.

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

I. Defining high poverty schools

We focus on schools rather than districts because 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 No Child Left Behind Act and the North Carolina ABCs accountability program single out the school as the unit of accountability, it is logical to investigate the extent to which schools of different types are playing on a level playing field in terms of their access to the teaching and leadership resources that are essential for meeting the achievement goals required under those accountability systems.

Throughout this paper, we disaggregate the analysis by level of school because elementary, middle and high schools differ from one another in important ways. [3] 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

[3] Schools were classified as follows. An elementary school is one that offers any of the elementary school grades (K-5) and is not in another category. A middle school is one that offers any grades between 5 and 8 and a plurality of the grades it offers are in this range. A high school is one that serves students in any of the grades 9-12 and has a plurality of grades in this range. Schools serving all grades all PK or K or 1 to 12 were omitted from the analysis. Such schools in no year accounted for more than 2 percent of all schools.

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 a our measure of student poverty. 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 apply for and were found eligible for the federally sponsored free lunch program (those with incomes below 130 percent of the poverty line).[4] For simplicity, 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. We then rank the schools from high to low in terms of their poverty rates and divide the schools into quartiles based on the percentage of poor students in the school. We define as "high poverty schools" the schools in quartile 1, that is, the ones 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 1 in 2004 is 60 percent. The comparable figures are 53 percent for middle schools and 39 percent 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 percent of the school mates of the typical student in a quartile 1 elementary school are receiving free lunch. By

[4] We define student poverty by the percentage 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.

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), 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 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 poverty (quartile 1) schools are 75.4 percent for elementary schools, 75.2 percent for middle schools and 68.4 percent 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 1 and quartile 4 schools, where the quartiles were redefined for each year, for the years 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
Elementary			
1995	62.3	16.1	46.2
1999	68.2	16.9	51.3
2004	73.9	16.8	57.1
Middle			
1995	53.9	13.5	40.4
1999	57.8	15.0	42.8
2004	66.4	16.6	49.8
High school			
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 paper is how the quality of teachers and principals in the high poverty schools compares to those 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. For principals, we use a variety of measures that include, but are not restricted to, credentials that are similar to those for teachers.

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 or not they are board certified. Not included in this list is the percentage of teachers who have a master's degree since in our previous research we find no evidence that that credential is associated with student achievement in North Carolina.

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 that fact that no matter how effective such teachers may ultimately become their inexperience in the early years of their teaching career typically render 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 she graduated. Following standard practice in the economics literature on teacher quality, we assign to each institution a competitive ranking based on information for the 1997-98 freshman class from the Barron's College Admissions Selector. Barron's reports seven categories 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." Lateral entry licenses are issued to individuals who hold at least a bachelors degree with a minimum 2.5 GPA and the equivalent of a college major in the area in which they are assigned to teach. Such teachers must affiliate with colleges and university to complete prescribed coursework. Currently the lateral-entry licenses are issued for two years and can be renewed for a third year. The "other" category includes a variety of provisional, temporary, and emergency licenses. 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 and on the school level or the subject. We normalized test scores for each of 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 file, 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 incentives in the form of a 12 percent boost in pay for teachers to do so. Such certification, which requires teachers 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 and is far more difficult to obtain than state licensure. Higher percentages of Board 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 non-regular 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 National Board 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 Board certified teachers. While 3.9 percent of the teachers in high poverty high schools are Board certified, more than double that percent are Board certified in the schools serving the most advantaged students.

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)
Elementary schools				
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
Middle schools				
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
Non-regular 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
High schools				
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
Non-regular 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 quintiles 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 0) 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 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 has 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)

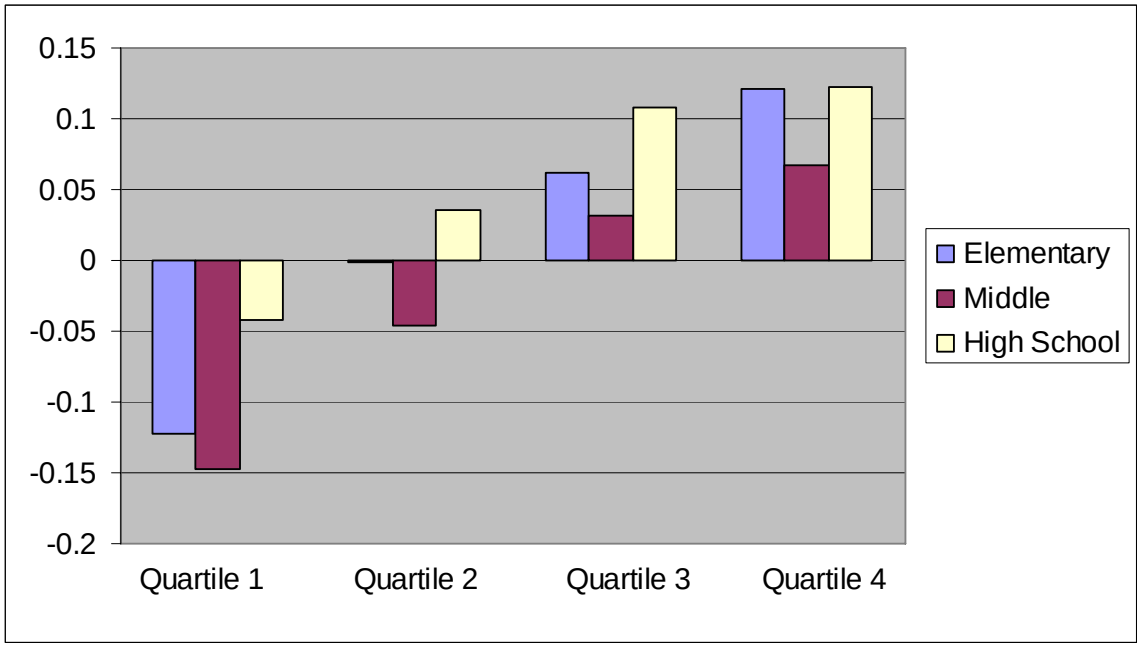


Table 4. Teachers with less than three years of experience, high and low poverty schools, by school level, selected years, 1995-2004.
(weighted average in percent, except where noted).

	Quartile 1 (high poverty schools)	Quartile 4 (low poverty schools)	Difference (quartile 1-quartile 4) percentage points
Elementary			
1995	17.4	14.5	2.9
1999	21.5	16.2	5.3
2004	18.7	13.2	5.4
Middle			
1995	19.5	16.4	3.2
1999	26.0	18.8	7.2
2004	24.6	13.9	10.7
High school			
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.

Patterns of principal quality

Measuring the quality of principals is more challenging both 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. Our proxies for principal quality are:

Principal test scores. The vast majority of principals in the state of North Carolina have Praxis II 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 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 Leadership Licensure Exam (SLLA). 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 an assistant

principal. From that we can calculate the years that they have been a school administrator. 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).[5] 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.[6] Because the survey was administered in only one year, it provides a measure of leadership quality just for the set of principals who were teaching in that year.

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 scores, tenure in the school, and the two measures of the undergraduate college. For all but the last row, higher numbers represent higher quality. Appendix Table A2. provides the comparable information by level of school.

[5] This survey was administered in partnership with the Commisison, assistance from the North Carolina Association of Educators, and support and funding from BellSouth. (http://www.ncptsc.org/WorkingConditions.htm.)

[6] For more details on the survey and the construction of the leadership ratings, see Wheeler 2006. The measure appears to be moderately reliable, but is not available for all schools because of non response. Moreover, average leadership ratings differed systematically by the characteristics of the school.

Table 5. Proxies for principal quality, by poverty quartile, all levels, 2004.
(Weighted averages; sample sizes in parentheses)

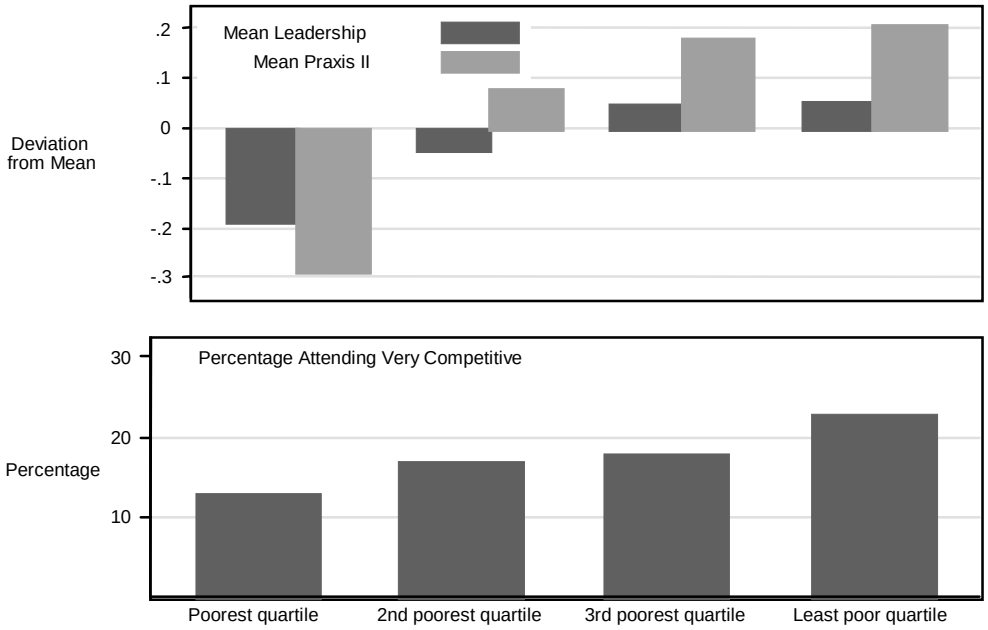
	Quartile 1 (high poverty schools)	Quartile 2	Quartile 3	Quartile 4 (low poverty schools)
Praxis score	-0.29 (465)	0.08 (487)	0.18 (500)	0.21 (435)
NTE scores	-0.37 (284)	-0.04 (322)	0.13 (332)	0.26 (283)
SLLA score	-0.14 (94)	0.23 (89)	0.55 (87)	0.14 (52)
Leadership rating	-0.19 (216)	0.04 (232)	0.05 (260)	0.05 (227)
Tenure in the school (years)	3.74 (480)	4.08 (505)	4.00 (514)	4.20 (444)
Competitive undergraduate institution (%)	0.13 (469)	0.17 (497)	0.18 (505)	0.23 (433)
Less competitive undergraduate institution	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 quintiles. For the three test measures at the top of the table, the average test scores in the high poverty schools are below the state wide average of 0. 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 low 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 subsample 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. The main story for teachers is based on the normal functioning of teacher labor markets.

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 in 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, if they have the opportunity to do so. 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. As a result of these processes, any new teachers that the district hires are more likely to end up in the high poverty schools since that is where the openings are. 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 vary across school districts. To the extent that teachers are sufficiently 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 percent in the high poverty schools exceeds that in the low poverty schools by more than 40 percent. Further, more than a 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 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.[7]

[7] 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 (Clotfelter, Ladd, Vigdor and Aliaga

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)
Elementary schools				
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
Middle schools				
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
High schools				
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 section II above but also exert their own harmful effects. High turnover rates are disruptive and make it difficult for schools to develop a coherent educational programs and to provide consistent programming from one year to the next.

Table 7 illustrates the movement of teachers over the period 1999 to 2004. The first row for each level of schooling is the number of teachers in each 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

2004; Clotfelter, Glennie, Ladd and Vigdor, 2006a, 2006b). 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.

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. The table applies only to elementary school teachers.

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 LEA	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 in those who moved to a different district. Consistent with the pattern of turnover rates described above, only about 27 percent of the teachers in the high poverty schools were still in the same school five years later in contrast to 34 percent 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. [8]

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 percent in contrast to 31 percent in the more affluent schools. Across quartiles of high schools the percentages who remained ranged from 26.5 percent to 37 percent.

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

[8] In future work, we plan to investigate these moves in more detail.

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 Mecklenbureg 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 percentage points 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. 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 percent, far lower than the average rates above 75 percent 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 quintiles 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 on in schools similar to the ones they attended. (Loeb and Reininger, 2004, pp.48-50.) In New York, more than 3 out of 5 teaches who began their teaching careers between 1999 and 2002 started teaching in a district within 15 miles of the district in which they attended high school and 5 out of 6 started teaching within 40 miles. This preference to return home can make it hard for schools in some large urban areas and some rural areas to attract teachers. 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 has relatively weak qualifications.

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 schools, face in retaining teachers. 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 (Clotfelter, Ladd, Vigdor and Aliaga, 2004)

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 within which they have taught. 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 (Gates et al. 2004). 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. 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 (Gates et al. 2004) 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 policy makers are committed to improving the quality of the leadership in those schools.

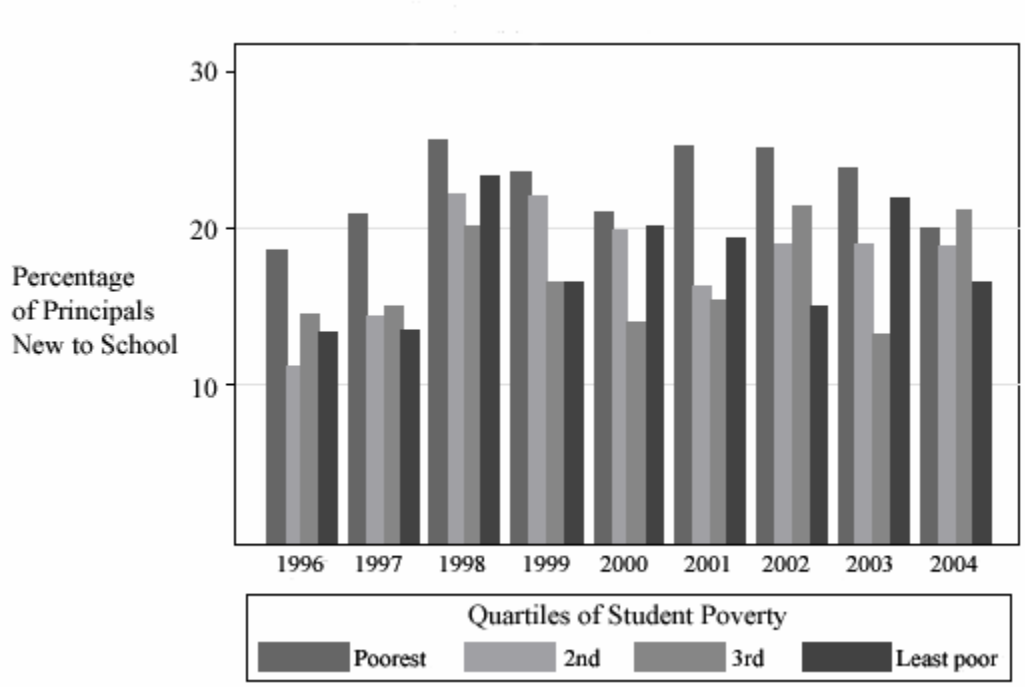
Figures 3 and 4 provide some insight into the patterns of principal turnover and movement. As in previous tables and figures, averages are weighted by school size unless otherwise noted. Ultimately, they suggest that these patterns are largely in keeping with those observed among teachers.

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 percent 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 percent.[9]

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

[9] 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.



positions and, later, to the principalships within the same school, this unequal distribution of new principals may well be attributable to teacher sorting.

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.[10]

[10] 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 percent, respectively**).**

Figure 4. Qualifications of new principals across schools by poverty quartile, all levels, by quartile of student poverty.

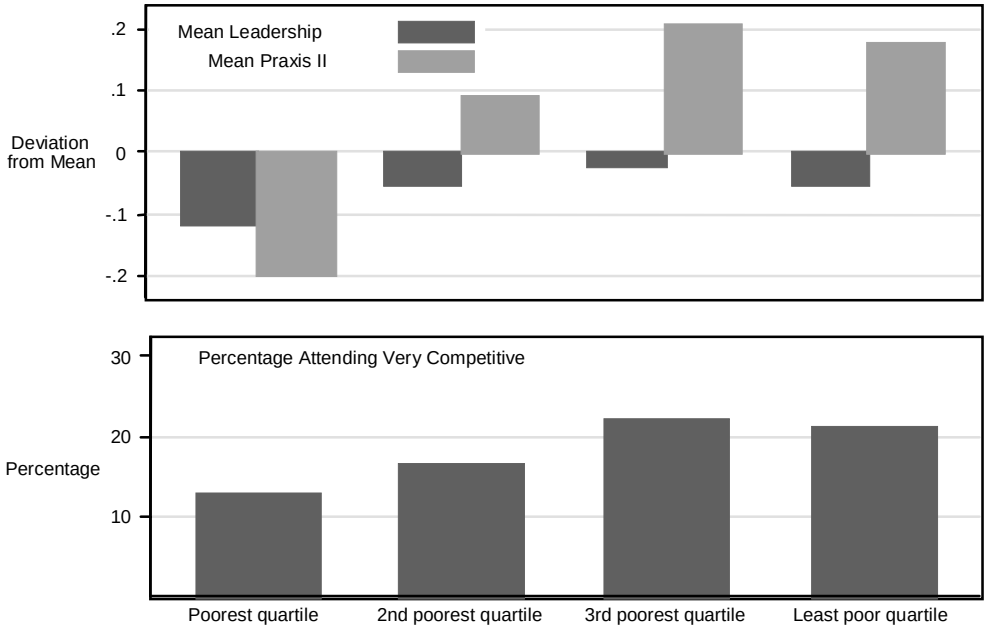


Table 9. Poverty rates in old and new schools for principals who changed schools between 1996 and 2004.
(Percent except where noted)

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 paper 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. 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 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 policy makers 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.

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 paper, 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 data 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 (Clotfelter, Ladd and Vigdor, 2006a; Clotfelter, Ladd and Vigdor, 2006b).

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 10 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 credentials is a novice teacher, graduated from a uncompetitive college, is not certified, 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 (Clotfelter, Ladd, and Vigdor, 2006a).

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. For reading the effects 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. 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. 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 section 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.

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
10 years of experience	No experience	-0.079	-0.094	-0.053	-0.072
Competitive undergraduate college	Non competitive 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, Ladd, and Vigdor, 2006a.

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 (Wheeler, 2006). That evidence is of two types: evidence that principals with better credentials generate better school wide 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.

The evidence emerges from analyses that take into account the fact that principals with better qualification tend to select into schools with higher performing students and higher quality teachers. 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 unobserved characteristics of the schools.[11] 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 5 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 (Wheeler, 2006, p. 22).[12] 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 be improving student achievement is through their ability to reduce teacher turnover and to staff their schools with more

[11] 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.
[12] 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.

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. In addition, an additional year of tenure in a school predicts a reduction of teacher turnover at all three levels of schooling.[13] 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.

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. (For a discussion of this supply oriented strategy in the North Carolina context, see Damico, 2004.) 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 paper, 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.

[13] While one might expect an effective new principal's first year of two to be associated with higher turnover of teachers as he or she pushes out teachers perceived to be ineffective, Wheeler (2006) finds no evidence of that type of "cleaning house".

Although there is debate in the literature regarding the power of higher salaries to convince teachers to work in high-poverty schools (see, for example, Hanushek, Kain and Rivkin 1999), our previous research (Clotfelter, Glennie, Ladd and Vigdor 2006) suggests that modest targeted increases in salary can reduce turnover rates in such schools. 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. 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 ever 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 percent decrease in turnover rates among the affected teachers. Moreover this positive outcome emerged despite various problems associated with the implementation of the program.

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 paper.

References

Betts, J. R., K. S. Rueben and A. Danenberg. 2000. *Equal Resources, Equal Outcomes? The Distribution of School Resources and Student Achievement in California* (San Fancisco: Public Policy Institute of California, 2000). http://www.ppic.org/main/publication.asp?I=64, 5/1/06.

Clotfelter, C.T., H.F. Ladd, and J.L.Vigdor 2006a. "How and why do teacher credentials matter for student achievement?" Paper presented at World Bank Conference in Dijon, France, June, 2006. (also forthcoming in slightly revised form in the *Economics of Education Review*.)

Clotfelter, C.T., H.F. Ladd, and J.L.Vigdor. 2006b "Teacher-Student Matching and the Assessment of Teacher Effectiveness." *Journal of Human Resources.*

Clotfelter, C.T., H.F. Ladd, and J.L.Vigdor, 2004. "Do school accountability programs make it more difficult for low-performing schools to attract and retain high quality teachers?" *Journal of Policy Analysis and Management*, 23(2), 251-271.

Clotfelter, C. T., E. Glennie,, H.F. Ladd and J. L. Vigdor. 2006b. "Would Higher Salaries Keep Teachers in High-Poverty Schools? Evidence from a Policy Intervention in North Carolina," NBER WP #12285.

Damico, D. 2004. "The Shortage of Teachers in North Carolina: Can We Attract and Retain Enough?" *North Carolina Insight* (August). pp. 2-28.

Gates, Susan M., Cassandra Guarino, Lucrecia Santibanez, Abigail Brown, Bonnie Ghosh-Dastidar, and Catherine H. Chung. 2004. "Career Paths of School Administrators in North Carolina: Insights from an Analysis of State Data." Santa Monica, CA: RAND.

Gutmann, A. 1987. *Democratic Education*. Princeton: Princeton University Press.

Hanushek, E. A., J.F. Kain, and S.G. Rivkin. 1999 "Do Higher Salaries Buy Better Teachers?" NBER WP #7082.

Lankford, H., Loeb, S. and Wyckoff, J. (2002) "Teacher Sorting the Plight of Urban Schools : A Descriptive Analysis," *Education Evaluation and Policyt Analysis*, 24(1), 37-62.

Leithworth, K, K.S. Lewis, S. Anderson and K. Kahlstrom."Review of Research: How Leadership Influences Student Learning. " Minneapolis, MN: The Center for Applied Research and Educational Improvement at the University of Minnesota.

Loeb, S. and M. Reigninger. 2004. *Public Policy and Teacher Labor Markets: What We Know and Why it Matters.* The Education Policy Center at Michigan State University (April).

McLaughlin, M. 2004. "Recommendations to Address the Teacher Shortage in North Carolina. *North Carolina Insight* (August). p. 29.

Rothstein. R. 2004. *Class and Schools: Using Social, Economic and Educational Reform to Clsoe the Black-White Achievement Gap.* Washington D.C.: Economic Policy Institute.

Wheeler, J. 2006. *An Analysis of Principal Turnover, Distribution, and Effectiveness in the State of North Carolina.* Master's project, Sanford Institute of Public Policy.

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
Elementary Schools				
# 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 NC	8.4%	29.1%	37.8%	19.5%
% Schools in Central NC	71.5%	53.8%	47.1%	71.5%
% Schools in East NC	20.1%	17.2%	15.1%	9.0%
Middle Schools				
# 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 NC	2.7%	23.9%	37.2%	21.2%
% Schools in Central NC	72.3%	53.1%	45.1%	68.1%
% Schools in East NC	25.0%	23.0%	17.7%	10.6%
High Schools				
# 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 NC	6.9%	26.5%	40.2%	19.6%
% Schools in Central NC	63.7%	49.0%	44.1%	67.6%
% Schools in East NC	29.4%	24.5%	15.7%	12.7%

Source. Calculated by the authors with data from the NC Education Research Data Center.