

**UNDERSTANDING “*POOR*” PERFORMANCE:  
Palmetto Achievement Challenge  
Test (PACT) Scores and Poverty**

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## ***Understanding "Poor" Performance:***

### **Palmetto Achievement Challenge Test (PACT) Scores and Poverty**

#### **Overview:**

Current education reform initiatives, in South Carolina and around the nation, heavily rely upon systems of testing and accountability. These tools can be effective means for helping educators benchmark existing performance levels and for setting attainable goals, and they can be used as a basis for offering potent motivations in the form of performance incentives. But the effectiveness of testing systems for promoting improved performance is largely a function of appropriately set and interpreted standards-- at once reflecting society's drive toward genuine advances in educational achievement and equity of achievement expectations. Policies that attach consequential penalties to test results while remaining insensitive to the context of performance, or which fail to adequately invest in performance contexts where necessary, will broaden rather than bridge achievement gaps between students of different socioeconomic circumstance. It is of paramount importance that we now address this issue, in light of pending Federal initiatives and the possibility of enforcing "meet the standards or repeat the grade" policies in South Carolina.

A key consideration for interpreting a school's performance on standardized tests is poverty. Research documenting the relationship between socioeconomic disadvantage and poor academic performance is abundant, and we face the difficult challenge of setting ambitious standards that represent genuine educational improvements without unintentionally ensuring failure among large proportions of our poor youth. Certainly children in poverty can and often do succeed, but overwhelming empirical evidence shows that poverty most often represents a substantial hurdle to academic success. The notion that all children can reach high standards is a goal toward which we must strive but, as the National Education Association points out, the ability of our current education system to make this a reality must be seriously questioned given the inadequate and unequal distribution of resources. It is therefore socially unjust to set standards and then ignore overt inequalities in the opportunities students have to learn.

The remainder of this report briefly reviews the movement toward standardized testing systems and the relationship between student poverty and test performance, followed by a presentation of school-level performance on the Palmetto Achievement Challenge Test (PACT) in South Carolina that accounts for the effects of poverty. We conclude with a set of policy implications and recommendations.

### **Background:**

**Testing Standards:** In a 1993 report, the National Assessment of Educational Performance (NAEP) program reported that 75 percent of students scored below proficiency levels in math, and two-thirds scored below proficiency levels in reading.<sup>1</sup> That same year, the District of Columbia announced that no first- or second-graders would be denied advancement to the next grade, regardless of achievement levels.<sup>2</sup> These were alarming echoes of concerns expressed a decade earlier in what has become a benchmark report in the testing standards movement, "A Nation at Risk: The Imperative for Educational Reform."<sup>3</sup> The report warned of America's passive decline in emphasis on educational performance, and commented, "If a foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war."

Despite its critics, "A Nation at Risk" set in motion a chain of events laying a foundation for the current testing standards movement, including changes in South Carolina (Table 1). Education production had been regarded as the domain of localities and their states, but by 1986 the general consensus was that states needed assistance--although the type of assistance needed was intensely disputed. Nonetheless, that year a task force of governors led by Lamar Alexander, who later served as Education Secretary in the George H.W. Bush administration, released an influential report titled "Time for Results" which suggested that localities receive funding and flexibility on teaching methods in exchange for accountability for student performance. The following year, the current toward testing standards quickened with the release and attention to a report titled "Cultural Literacy: What Every American Needs to Know" that proposed a minimal framework of knowledge for all Americans. The testing standards movement, especially with its orientation towards Washington and Federal funds, gained its essential momentum in 1989 with the convening of the National Governors' Association Education Summit. The summit moved to collaborate with federal efforts to set national goals, representing the first concerted attempt by Washington to actively participate in education oversight. Early the next year, six national educational goals emerged:

1. By the year 2000, all children in America will start school ready to learn.
2. The high school graduation rate will increase to at least 90 percent.
3. American students will leave grades 4, 8 and 12 with demonstrable competency in English, mathematics, science, history and geography, and every school will ensure that all students learn to use their minds so they may be prepared for responsible citizenship, further learning, and productive employment in a modern economy.
4. American students will be first in the world in science and mathematics achievement.
5. Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.
6. Every school in America will be free of drugs and violence and will offer a disciplined environment conducive to learning.

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<sup>1</sup> Reported in Education Week, September 15 1993.

<sup>2</sup> Reported in the Washington Post, November 8 1993.

<sup>3</sup> National Commission on Excellence in Education. A Nation at Risk: The Imperative for Educational Reform (1983).

Table 1. Chronology of Key Events Leading to Standards and Assessment Emphases

Date	Event
1983	"A Nation at Risk" released by the Education Department's Commission on Excellence in Education, stirs discussion on current and future states of American education performance
1984	South Carolina plans for education reform through passage of Education Improvement Act.
1986	"Time for Results" released by the National Governors' Association, proposes an exchange in which states will give localities funding and flexibility on teaching methods in return for accountability on achievement results.
1987	"Cultural Literacy" published by E.D. Hirsch Jr., proposes a minimum framework of knowledge for all Americans.
1989	President George H.W. Bush convenes an education summit with the National Governors' Association, headed by his future successor Bill Clinton.
1990	Governors move to collaborate with federal efforts to set national goals and initiate "voluntary" nationwide academic standards.
1990	Six national education goals are announced, and will come to represent key elements of President Bush's "America 2000" initiative.
1990	Bipartisan National Education Goals Panel is created to measure education progress.
1991	President Bush announces "America 2000" initiative to reinvent American education.
1991	National Council on Education Standards and Testing created to determine whether standards are feasible and desirable.
1991	South Carolina assesses its progress toward education reform and reports findings in report titled "Reaching for Higher Standards 1991," which concludes that improvements had leveled off.
1992	National Council on Education Standards and Testing urges national and state leaders to set ambitious state standards for curricula, assessments and service delivery.
1992	Education Department funds development of voluntary national curriculum standards.
1992	Governor Carroll Campbell creates the South Carolina Education Goals Panel to establish state goals within the framework of the national education goals and to develop strategies for their achievement.
1993	Clinton administration revises Bush agenda, renames it "Goals 2000" and proposes that national education goals be written into law.
1993	Proviso 33 enacted by the South Carolina General Assembly, which directs the Department of Education to prepare by January 1995 a statewide plan to meet national education goals.
1994	Goals 2000 approved by Congress, which included a requirement that states develop detailed plans for setting and assessing standards reflecting national goals in order to receive federal education funds. Title IX specifically addresses federal role of education interventions related to minorities and the poor.
1995	South Carolina adopts its Goals 2000 State Plan, reflecting national emphases on standards and assessment.
1998	South Carolina passes the Education Accountability Act, setting standards for improving the state's K-12 educational system. Governor enabled to establish the Education Oversight Committee to enact the EAA, including assessment of progress related to statewide standards.

Soon after the national education goals were announced, a bipartisan National Education Goals panel, consisting of eight governors, two administration officials and four members of Congress, was formed to measure education progress. In 1991 President Bush formally announced to the public his plan to reinvent American education as part of his "America 2000" initiative, and the National Council on Education Standards and Testing was created by Congress and the Goals Panel to determine the feasibility and desirability of the standards model. The Council reported favorably on the standards model the following year, and the US Department of Education began funding states to develop curriculum standards reflecting the national goals.

After his inauguration, President Bill Clinton, an early leader in the standards discussions, revised the Bush agenda, renamed it "Goals 2000," and proposed that the national education goals be written into law. In 1994, Congress approved a version of Goals 2000 that required states to develop detailed plans for setting standards in conjunction with the legislated national goals and for measuring progress toward those goals. Embodied in the legislation was a requirement that states develop these plans in order to be eligible for federal education funds, and Title IX provisions for a federal role in assuring quality of education for minorities and the poor within the context of the national goals.

In South Carolina, momentum for education reform paralleled that occurring in Washington. In a series of progressive actions, including the Education Finance Act of 1977 and the Education Improvement Act of 1984, South Carolina leaders acknowledged the need for systematic reform and set about the task. While these early initiatives were prudent, their long-range effectiveness proved dubious as the momentum of reform slowed by decade's end. "Reaching for Higher Standards 1991" reported South Carolina's progress toward the national education goals, and suggested possible explanations for the state's leveling-off in student performance at that time:<sup>4</sup>

- Past education reform efforts in South Carolina were essentially intended to bring students up to minimum standards of achievement; progress toward higher levels of achievement required different approaches.
- Grade failure, poor performance on standardized tests, participation in remedial and special programs, and suspension and expulsion rates were disproportionately high among South Carolina's African-American males.
- Social conditions and quality of life issues sorely compromised student ability to achieve--one-fourth of families were headed by a single parent, one fifth of all women in the state had a least one child by age 20, and approximately thirty percent of births were to unwed mothers.
- Much of South Carolina's student population was disadvantaged in both social and economic terms--for example, pervasive poverty levels in the state show a statistically significant negative correlation to testing outcomes.

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<sup>4</sup> History of South Carolina's Goals 2000 State Plan, [www.sde.state.sc.us:80/archive/educator/goal00in.htm](http://www.sde.state.sc.us:80/archive/educator/goal00in.htm)

With South Carolina's progress slowing, and given the growing momentum nationwide for performance standards, Governor Carroll Campbell began development of state goals and standards reflecting the national goals. At that time the South Carolina Education Goals Panel was formed and initiated work on developing the state's specific goals and strategies for achieving them, with attention afforded the context (such as conditions of high poverty) of student performance in South Carolina. The next year, the South Carolina General Assembly set in law the course toward high-stakes standards and assessment, passing Proviso 33 which directed the Department of Education to prepare a statewide plan to meet national education goals. In 1995, South Carolina adopted its Goals 2000 State Plan in accordance with the mounting national emphasis on high student achievement and school accountability. The Education Accountability Act was passed in 1998, setting standards for improving the state's K-12 educational system, and the Education Oversight Committee was formed to enact the EAA, including assessment of progress related to statewide standards.

Over the past two decades, and possibly a longer period of time, South Carolina and the nation have tried to improve education by raising standards and by holding educators and students accountable for achieving those standards. The practical expression of assessing progress toward national and state goals has been increased testing. In recent years, the frequency that students are tested and the consequences of test performance have both increased dramatically. Every state in the nation now tests its students to measure achievement relative to national standards, and states increasingly are using test results to make important program and funding decisions. Over half the states use test scores, alone or in conjunction with other measures, to rate school performance, allocate rewards, or levy penalties<sup>5</sup>. Some states, including South Carolina, either have or are considering policies whereby students either "meet the standards or repeat the grade." We are now in an Era of Tests, and "Number 2" pencils are a precious (and scarce, on testing days) national resource.

With sufficient justification, we have sharply moved to improve what we teach our youth and to carefully gauge our effectiveness. However, lofty benchmarks for student performance and myopic measurements of the degree to which a school and its students fall above or below standards are problematic. Over-reliance on standardized test scores ignores the tremendous complexity of the learning process, and evaluation of only raw scores overlooks the numerous contextual factors that influence academic performance.

***Standardized Test Performance and Poverty:*** Poverty, as a contextual factor to aid in understanding academic performance, has been directly linked to low levels of educational attainment. To best explain this dire relationship, it is necessary to understand the impacts of poverty prior to beginning the formal education process. Research has shown the extreme importance of a child's first years of life on their emotional and intellectual development, a time, regrettably, when millions of American children are immersed in a sea of poverty<sup>6</sup> (Figure 1).

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<sup>5</sup> Nancy Kober. "It Takes More than Testing: Closing the Achievement Gap." Center for Education Policy (2001).

<sup>6</sup> Poverty and Brain Development in Early Childhood (1997). <http://cpmcnet.columbia.edu/dept/nccp/brain.html>

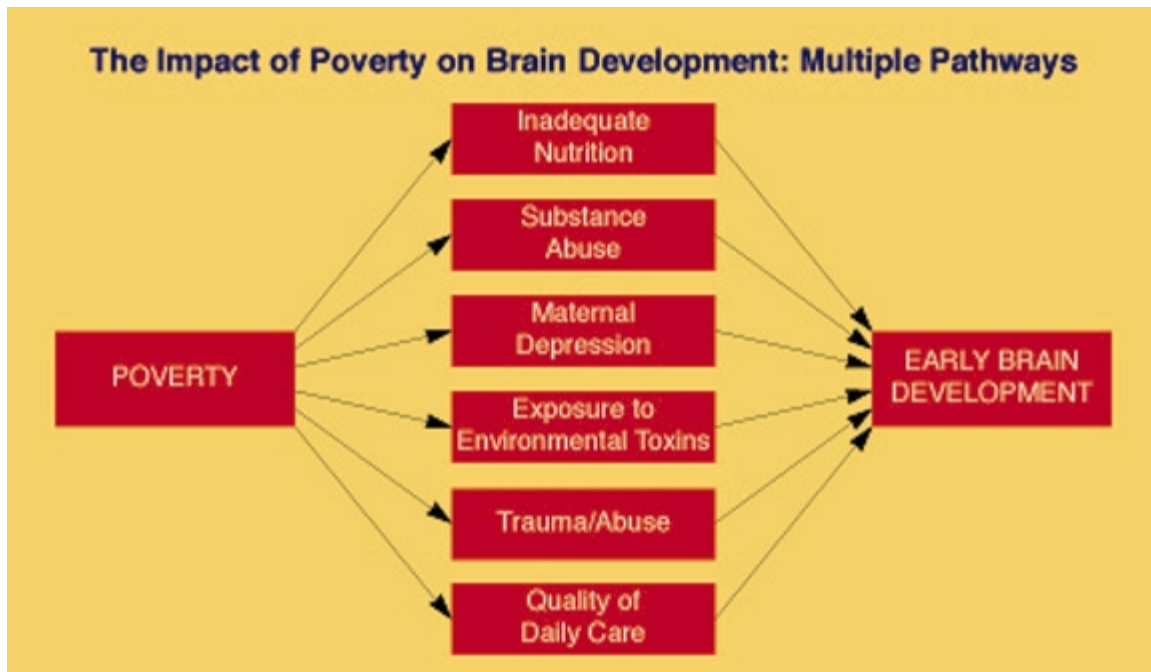


Figure 1. Impact of Poverty on Early Brain Development, National Center for Children in Poverty (1997).

Tests of vocabulary, reading comprehension, arithmetic, and general knowledge reveal much lower scores among children lacking proper nutrition, and lower nutritional levels are directly related to level of poverty.<sup>7</sup> The impacts of substance abuse, including tobacco and alcohol use, affect children both during and after pregnancy.<sup>8</sup> Children with mothers suffering from depression are less likely to receive stimulation and emotional support necessary for healthy brain development, which may lead them to be less active, more withdrawn and with shorter attention spans.<sup>9</sup> Healthy brain development can also be impeded by exposure to environmental toxins. A 1991 study reported that toxic levels of lead could be found in over sixteen percent of American children, and that over half of African American children living in poverty had toxic levels of lead in their bloodstream.<sup>10</sup> Experiences of emotional or physical abuse or trauma often results in reduced capacities for emotional bonding, leads to increased incidence of anxiety, depression, and violence in later life, and is more common within poorer families.<sup>11</sup> While high-quality day care can facilitate intellectual development of children living in poverty, inadequate day care impedes brain development by offering either negative or insufficient interaction.<sup>12</sup> Poverty is a prevailing risk factor that multiplies the likelihood that children will be exposed to several other risk factors, factors that result in negative impacts on early brain development, ability to learn, and quality of later life.

<sup>7</sup> L. Brown and E. Pollitt. "Malnutrition, Poverty and Intellectual Development." *Scientific American*, 274(2), pp. 38-43 (1996).

<sup>8</sup> L. Mayes. "Early Experience and the Developing Brain: The Model of Prenatal Cocaine Exposure." University of Chicago. (1996).

<sup>9</sup> D. Belle. "Poverty and Women's Mental Health." *American Psychologist*. (1990).

<sup>10</sup> "Healthy Brain Development." National Health / Education Consortium. (1991).

<sup>11</sup> J. Brooks-Gunn et al. "Toward an Understanding of the Effects of Poverty on Children." (1995).

<sup>12</sup> M. Burchinal et al. "Type of Daycare and Preschool Intellectual Development in disadvantaged Youth." *Child Development*, 60(1), pp. 128-137 (1989).



In 1995, almost a full quarter of American children under age three lived in poverty--and this in the most prosperous nation in the world. This fact combined with its implications for early brain development supports recent research that concludes that substantial achievement gaps exist between affluent and poor children even *before* they start school.<sup>13</sup>

These achievement gaps persist after entry to our educational systems, and quite often are exacerbated during the educational process. African American and Hispanic families tend to have higher rates of poverty than Caucasians. African Americans, including those from middle class backgrounds, are more likely to drop out of school than even poor Caucasians. The average score for African American 13-year olds on the National Assessment of Educational Progress (NAEP) mathematics test was more than 10 points below the average score of their Caucasian counterparts, and the average score for Hispanic 9-year olds on the NAEP science test was the equivalent of three grade levels behind the average score for Caucasians.<sup>14</sup>

Standards-based educational reform has revealed that many students are performing at lower than expected levels, and that a disproportionate share of these students are African American and Hispanic youth living in poverty.<sup>15</sup> Certainly, we can not assume that race or ethnicity is a determinant of poor academic performance. Instead, the reverberations of poverty--from the effects on early brain development to insufficient home resources to inadequate parental involvement to social stigma throughout a child's academic tenure--seem far more rational explanations. Furthermore, the learning environments of poorer schools are not equal to those of more affluent schools. Schools with heavy concentrations of student poverty are substantially more likely to have inexperienced and uncertified teachers than are the schools of more affluent children, a finding reported in research by the Education Trust and others.<sup>16</sup>

Poverty can be understood as a lack of inputs into educational production--whether a lack of financial resources, such as tax effort, or adequate home and community supports, or sufficient nutrition and health care. The movement to improve academic performance in public schools through rigorous curricula standards and high-stakes accountability through testing raises valid concerns regarding equity of opportunity to achieve standards, concerns that educational opportunities and resources are so unevenly distributed that poor children are ill-positioned to meet standards compared to their more affluent counterparts. Equity must remain at the forefront of educational standards-setting because public policy that develops standards, and associated consequences for failure to meet them, and then ignores savage inequalities in the opportunities students have to achieve, is inherently unjust.

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<sup>13</sup> Nancy Kober. "It Takes More than Testing: Closing the Achievement Gap." Center for Education Policy (2001).

<sup>14</sup> Nancy Kober. "It Takes More than Testing: Closing the Achievement Gap." Center for Education Policy (2001).

<sup>15</sup> Nancy Kober. "It Takes More than Testing: Closing the Achievement Gap." Center for Education Policy (2001).

<sup>16</sup> J. Jennings. "Can Poor Children Learn More Through Improving their Schools or Making their Families Stronger?" [www.financeproject.org/achievement.htm](http://www.financeproject.org/achievement.htm)

In South Carolina, the instances and influences of poverty are abundant. Our test package designed to assess elementary and middle school students' progress toward standards is the Palmetto Achievement Challenge Test (PACT). Data from 1999 and 2000 PACT assessment cycles show an average of over fifty-five percent of South Carolina elementary and middle school students were enrolled in free- or reduced-lunch programs. Almost a full quarter of South Carolina schools had at least three-quarters of their students participating in free- or reduced-lunch programs. Reflecting the findings of the Education Trust, in South Carolina we observe that the presence of poverty in a school, as measured by free- or reduced-lunch enrollment, is significantly and negatively related to teacher training and teacher experience. In South Carolina, as elsewhere, our better trained, more experienced teachers are likely serving students least challenged by the debilitating effects of poverty.

The percentage of a school's students enrolled in free- or reduced-lunch assistance, when compared to other possible explanatory variables, shows the strongest correlation to PACT scores, alone explaining over 62 percent of the variation in test outcomes (Table 2).

Table 2. Correlation of Selected Explanatory Variables to School Average PACT Scores<sup>a</sup>

Explanatory Variable	Variable Label	Correlation with PACT Scores (r)	Percentage of Variation in PACT Scores Explained by Variable ( $r^2 \times 100$ )
Average percentage of students enrolled in free- or reduced-lunch program at schools, from 1999 and 2000 testing cycles	<b>scfreavg</b>	-0.789 <sup>b</sup>	62.3%
Percentage of student population classified as non-white (minority)	<b>pctminor</b>	-0.703 <sup>b</sup>	49.4%
School's average teacher salary	<b>avgsal</b>	0.410 <sup>b</sup>	16.8%
Percentage of school's teachers with Master's degree, Six-Year Certificate, or Doctorate	<b>pctgrddg</b>	0.278 <sup>b</sup>	7.7%
School's average teacher experience	<b>avgexp</b>	0.183 <sup>b</sup>	3.3%
Average percentage of students tested at school	<b>scavtspc</b>	0.128 <sup>b</sup>	1.6%
135-Day Average Daily Membership (ADM), two-year average	<b>scadmavg</b>	0.084 <sup>b</sup>	0.7%

a. "PACT scores" represent the average percentage of a school's students that satisfied minimum standard requirements in the 1999 and 2000 testing cycles.

b. Correlation is significant at the 0.01 level (two-tailed).

Even though each of the variables listed above shows a highly significant correlation to performance on the PACT battery, additional examination suggests that poverty remains the most powerful and explanatory of the set. For example, if all of the listed variables are included in a regression model, such that:

$$\text{School Average on PACT} = f(\text{scfreavg}, \text{pctminor}, \text{avgsal}, \text{pctgrddg}, \text{avgexp}, \text{scavtspc}, \text{scadmavg})$$

the model produces the following results:

$$\begin{aligned} F &= 256.63, \text{ significance} = 0.000 \\ \text{Multiple } r^2 &= 0.687 \\ \text{Standard Error} &= 8.23 \end{aligned}$$

However, if we simplify the model to show PACT performance as a function of poverty-level alone, here measured by percentage of students enrolled in free- or reduced-lunch program, we obtain the following results:

$$\begin{aligned} \text{School Average on PACT} &= f(\text{scfreavg}) \\ F &= 1413.03, \text{ significance} = 0.000 \\ r^2 &= 0.623 \\ \text{Standard Error} &= 9.08 \end{aligned}$$

Alone, poverty-level explains approximately 62% of the variation in scores on the PACT battery, and only 6% more of the variability in scores can be explained by including six additional, highly correlated variables.

Given ample theoretical and empirical evidence, it is wise to consider the effects of poverty levels on standards-based testing results. Statistical modeling enables researchers to measure the effects of conditions, such as levels of poverty, on testing outcomes. Upon measurement of the effects of factors such as poverty levels, test scores may be adjusted to reflect the typical impacts of such factors. In doing so, a more accurate representation of testing outcomes may be derived. Even many testing standards advocates support the notion of "opportunity to learn standards" that reflect a drive toward more equitable learning resources and adjustments to testing outcomes until fairness in learning resources and opportunities are made a reality.<sup>17</sup> Critics of adjusted test score assessment charge that such practices resign some students to failure by not holding them to equally high levels of expectations. So long as inequity affects test scores in such a measurable and profoundly debilitating manner, assessment must acknowledge these effects on student performance in the context of testing standards. We can expect similar performance from poor and affluent students alike only when there is no longer a profound negative correlation between participation in free- or reduced-lunch programs and standardized test performance.

Rather than awarding or penalizing school-level performance based solely on raw test scores, if appears that accounting for the effects of additional considerations, such as

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<sup>17</sup> Nancy Kober. "It Takes More than Testing: Closing the Achievement Gap." Center for Education Policy (2001).

poverty, is a far more equitable assessment practice. We think it wise, in the unfortunate but prevalent absence of true equity of learning opportunity, to more fully account for extraneous characteristics when assessing performance using standardized test scores.

Adjustments to test scores to account for additional contextual factors of performance, and comparisons of actual and expected test performance at school levels, better enables evaluators to identify which schools are enhancing the performance of their students within the socioeconomic contexts in which they function. This practice makes no judgements of an individual's ability to learn, but rather judges how well a school cultivates learning in light of their level of socioeconomic advantage. Education leaders, public policy leaders, and performance standards are obliged to acknowledge the relationship between poverty and education performance. It would be useful to identify which schools are able to excite performance beyond what would be expected given the effects of poverty, as well as which schools fail to fully capitalize on their more favorable circumstances.

### **PACT Scores Adjusted for Poverty Effects:**

To fairly assess school performance on standards-based testing, including distribution of awards and penalties as testing consequences, it is necessary to incorporate the influences of factors such as level of poverty. Conceptualizations of "exceptional" performance should be sufficiently broad to include schools that, despite lower than average scores, excite performance that exceeds expectations when the effects of poverty are accounted for. Comparisons of actual and expected school-level test performance, and adjusted scores accounting for poverty effects, accomplishes this, and better enables evaluators to identify which schools are enhancing the performance of their students within the contexts in which they function.

**Methods:** Data for these analyses were drawn from reports of 1999 and 2000 PACT testing cycles, available on the South Carolina Department of Education website at <http://www.myschools.com/reports/pact00/index.html>. For each school participating in PACT assessments, data were included that represent the percentage of students meeting or exceeding minimum standards on the test and the percentage of students enrolled in free- or reduced-lunch programs at each grade level served. After identifying grades served by each school, average percentage of students meeting or exceeding minimum standards on the test and average percentage of students enrolled in free- or reduced-lunch for each participating school were computed. Data representing several other variables, described earlier in this report, were also included in initial analyses but are not included in the following discussions.

To evaluate PACT performance in South Carolina schools while accounting for the effects of poverty, here defined as the average percentage of a school's students enrolled in free- or reduced-lunch programs (**scfreavg**), we used the following model:

$$\text{School PACT Average} = f(\text{scfreavg})$$

Analysis using the average percentage of a school's students meeting or exceeding minimum standards on the PACT (**scavg**) as the dependent variable and the average

percentage of a school's students enrolled in free- or reduced-lunch programs as the independent variable produced the following predictive regression equation:

$$Y_{\text{expected scavg}} = 89.6 - 0.49(\text{scfreavg})$$

$$F = 1413.03 \quad \text{Significance} = 0.000$$

$$r^2 = 0.62$$

$$\text{Standard Error} = 9.08$$

Use of this model allows us to compare a school's expected average PACT performance to their actual average PACT performance in a manner that accounts for poverty-related effects. We subtract a school's expected percentage of students meeting or exceeding minimum standards on PACT (**expected scavg**) from their actual percentage of students meeting or exceeding minimum standards (**scavg**), generating a "difference" score:

$$\text{Difference} = \text{scavg} - \text{expected scavg}$$

These "difference" values are standardized for comparative purposes, and offer insights into which schools perform better or worse than expected on PACT while accounting for poverty-related effects.

The term "predict" should not be misinterpreted as an attempt to "guess" performance on PACT, but instead refers to performance levels one may expect from a school given two factors:

1. The typical effect of poverty on PACT performance, derived from measurements of the relationship between the two drawn from all schools in South Carolina. Essentially, a two percentage point increase in students enrolled in free- or reduced lunch program is related to a one percentage point loss in students meeting minimum standards on PACT.
2. The school's level of poverty, as measured by student participation in free- or reduced lunch programs.

**Results:** We ranked the state's 856 schools included in this analysis by the difference in predicted and actual average PACT performance scores and by adjusted PACT scores (See Tables 3 through 7 for the Top 100 performing schools, ranked by adjusted PACT scores). For example, Anderson Primary School in the Williamsburg school district had an average of 73.2% of its students meet or exceed minimum standards on PACT over the 1999 and 2000 testing cycles, resulting in a raw score rank of 208<sup>th</sup>. Given their relatively high level of poverty (95.2% of their students in the free- or reduced lunch program) and the measured effect of poverty, the expected percentage of students meeting or exceeding PACT standards is 42.6%. Therefore, their observed performance on PACT greatly exceeds (+30.55%, significant at 0.001 level) what should be expected, given their circumstances related to poverty. When ranked by the difference in actual and expected PACT performance, Anderson Primary vaults to 3<sup>rd</sup> in the state. This suggests that, despite the typical effects of poverty on PACT performance, Anderson Primary School was able to cultivate better than expected performance by their students on PACT compared to other schools facing similar circumstances.

Adjusted PACT scores represent the percentage of a school's students that may have satisfied minimum PACT standards, if the effects of poverty were evenly distributed among schools. This computation either inflates or deflates a school's average PACT score, depending on the magnitude of difference in the school's percentage of students enrolled in free- or reduced-lunch programs. To arrive at this figure (**adjusted scavg**), the school's average percentage of students enrolled in free- or reduced-lunch programs (**scfreavg**) is subtracted from the statewide average for all schools (55.5%). The difference is then multiplied by the coefficient for the effect of poverty on PACT scores (0.49). This product is then subtracted from the school's actual percentage of students meeting minimum standards on PACT (**scavg**). The formula for calculating adjusted PACT scores is:

$$Y_{\text{adjusted scavg}} = \text{scavg} - 0.49(55.5 - \text{scfreavg})$$

Returning to the example of Anderson Primary School, adjustments to their raw average PACT score to account for the effects of their level of poverty, as measured by the percentage of their students enrolled in free- or reduced-lunch programs, and effectively standardizing the effects of poverty for all schools, their relative level of performance appears quite impressive.

$$\begin{aligned} Y_{\text{adjusted scavg}} &= 73.2 - 0.49(55.5 - 95.2) \\ &= 73.2 + 19.45 \\ &= 92.65 \end{aligned}$$

Adjusted scores offer insight into the performance of a school relative to their level of poverty. Schools with very low levels of poverty should be expected to perform substantially better than schools with very high levels of poverty. By adjusting scores, performance measurements better account for disparities associated with poverty and better enables education leaders to compare school-level average PACT performance.

Table 3. Adjusted School Ranking of PACT Performance Accounting for the Effects of Poverty--Rankings 1 - 20

<i>School</i>	<i>District</i>	<i>scfreavg</i> <sup>1</sup>	<i>scavg</i> <sup>2</sup>	<i>Raw Score Rank</i> <sup>3</sup>	<i>Expected scavg</i> <sup>4</sup>	<i>Difference</i> <sup>5</sup>	<i>Difference Z-Score</i> <sup>6</sup>	<i>Adjusted scavg</i> <sup>7</sup>	<i>Adjusted Rank</i> <sup>8</sup>
Hemingway Primary	Williamsburg	86.4	83.8	60	46.92	+36.86	+4.06 <sup>A</sup>	98.92	1
Holly Hill-Roberts HS	Orangeburg 3	52.3	96.6	2	63.76	+32.86	+3.62 <sup>A</sup>	95.06	2
Anderson Primary	Williamsburg	95.2	73.2	208	42.60	+30.55	+3.37 <sup>B</sup>	92.58	3
St. James-Gaillard Elem.	Orangeburg 3	87.2	70.9	262	46.51	+24.37	+2.69 <sup>C</sup>	86.42	4
South Elem.	Dillon 2	95.8	66.2	349	42.30	+23.88	+2.63 <sup>C</sup>	85.90	5
Stono Park Elem.	Charleston	76.6	74.5	176	51.76	+22.75	+2.51 <sup>D</sup>	84.85	6
St. Helena Elem.	Beaufort	95.7	64.9	382	42.32	+22.59	+2.49 <sup>D</sup>	84.61	7
Mayesville Elem.	Sumter 2	94.6	65.0	380	42.84	+22.12	+2.44 <sup>D</sup>	84.15	8
St. John Elem.	Calhoun	95.2	64.0	397	42.56	+21.45	+2.36 <sup>D</sup>	83.47	9
Wright Elem.	Anderson 2	38.3	91.4	11	70.69	+20.67	+2.28 <sup>D</sup>	82.92	10
Beaufort Elem.	Beaufort	76.4	72.4	221	51.87	+20.57	+2.27 <sup>D</sup>	82.67	11
Bakers Chapel Elem.	Greenville	62.5	78.0	121	58.73	+19.23	+2.12 <sup>D</sup>	81.39	12
Manning Elem..	Clarendon 2	78.3	69.5	279	50.92	+18.56	+2.05 <sup>D</sup>	80.65	13
St. Mark Elem.	Williamsburg	98.0	59.8	496	41.21	+18.56	+2.05 <sup>D</sup>	80.58	14
Forestbrook Elem.	Horry	41.9	87.1	32	68.90	+18.16	+2.00 <sup>D</sup>	80.39	15
New Prospect Elem.	Spartanburg 1	44.3	84.8	50	67.73	+17.02	+1.88	79.25	16
Walker-Gamble Elem.	Clarendon 3	65.9	74.0	187	57.02	+16.97	+1.87	79.11	17
Bethany Elem.	York 2	39.7	86.9	34	69.99	+16.86	+1.86	79.11	18
Rafting Creek Elem.	Sumter 2	90.6	61.9	447	44.86	+17.04	+1.88	79.08	19
Memminger Elem.	Charleston	92.6	60.7	476	43.84	+16.89	+1.86	78.93	20

1. Label "**scfreavg**" represents the average percentage of a school's students enrolled in free- or reduced-lunch programs, from 1999 and 2000 testing cycles.
2. Label "**scavg**" represents the average percentage of a school's students meeting or exceeding minimum standards on PACT, from 1999 and 2000 testing cycles.
3. Label "**raw score rank**" represents a school's statewide ranking based on **scavg**.
4. Label "**expected scavg**" represents a school's predicted percentage of students meeting or exceeding minimum standards on PACT, controlling for the observed influences of poverty.
5. Label "**difference**" represents the magnitude to which **scavg** exceeds or falls below expected PACT performance.
6. Label "**difference z-score**" represents a standardized measure of deviation from the average observed difference between **scavg** and **expected scavg**.
  - A. Actual average PACT performance is significantly greater than expected, controlling for poverty effects. Significant at 0.000 level (two-tailed).
  - B. Actual average PACT performance is significantly greater than expected, controlling for poverty effects. Significant at 0.001 level (two-tailed).
  - C. Actual average PACT performance is significantly greater than expected, controlling for poverty effects. Significant at 0.005 level (two-tailed).
  - D. Actual average PACT performance is significantly greater than expected, controlling for poverty effects. Significant at 0.01 level (two-tailed).
7. Label "**adjusted scavg**" represents a correction to **scavg** that accounts for the school's level of poverty (**scfreavg**) and the measured affect of poverty on PACT performance (**scavg**).
8. Label "**adjusted rank**" represents a school's statewide ranking based on **adjusted scavg**.

Table 4. Adjusted School Ranking of PACT Performance Accounting for the Effects of Poverty--Rankings 21 - 40

<i>School</i>	<i>District</i>	<i>scfreavg<sup>1</sup></i>	<i>scavg<sup>2</sup></i>	<i>Raw Score Rank<sup>3</sup></i>	<i>Expected scavg<sup>4</sup></i>	<i>Difference<sup>5</sup></i>	<i>Difference Z-Score<sup>6</sup></i>	<i>Adjusted scavg<sup>7</sup></i>	<i>Adjusted Rank<sup>8</sup></i>
East Elem.	Dillon 2	76.6	68.0	319	51.76	+16.22	+1.79	78.31	21
Delaine elem.	Sumter 2	80.8	65.8	359	49.68	+16.11	+1.78	78.19	22
Cedar Grove Primary	Anderson 1	31.5	89.9	15	74.04	+15.87	+1.75	78.15	23
Watkins Elem.	Richland 1	96.1	58.2	536	42.13	+16.05	+1.77	78.07	24
St. James-Santee Elem.	Charleston	89.3	61.3	455	45.49	+15.81	+1.74	77.86	25
Buist Academy	Charleston	11.5	99.1	1	83.92	+15.21	+1.68	77.57	26
Lockett Elem.	Orangeburg 4	69.2	70.7	267	55.42	+15.32	+1.69	77.44	27
Marrington Elem.	Berkeley	54.1	78.1	120	62.89	+15.25	+1.68	77.44	28
Charleston Progressive	Charleston	83.9	63.1	416	48.14	+15.00	+1.65	77.07	29
Johnsonville Elem.	Florence 5	57.2	76.2	151	61.33	+14.87	+1.64	77.05	30
Carver-Lyon Elem.	Richland 1	98.5	56.0	574	40.96	+15.03	+1.66	77.04	31
Jonesville Elem.	Colleton	95.5	56.8	564	42.45	+14.34	+1.58	76.37	32
Men-Riv Park Elem.	Berkeley	55.5	76.3	148	62.21	+14.07	+1.55	76.25	33
Merriwether Elem.	Edgefield	37.2	85.2	45	71.25	+13.93	+1.54	76.18	34
Duncan Elem.	Spartanburg 5	61.4	73.2	204	59.28	+13.91	+1.53	76.07	35
RE Davis Elem.	Sumter 2	90.3	59.0	510	45.01	+14.00	+1.54	76.04	36
McLaurin Elem.	Florence 1	69.3	69.2	286	55.38	+13.83	+1.53	75.96	37
Richard Carroll Primary	Bamberg 1	70.5	68.5	305	54.77	+13.68	+1.51	75.80	38
Macedonia Middle	Berkeley	60.3	73.4	200	59.81	+13.60	+1.50	75.76	39
Mt. Pleasant Academy	Charleston	14.8	95.7	3	82.28	+13.40	+1.48	75.75	40

1. Label "**scfreavg**" represents the average percentage of a school's students enrolled in free- or reduced-lunch programs, from 1999 and 2000 testing cycles.
2. Label "**scavg**" represents the average percentage of a school's students meeting or exceeding minimum standards on PACT, from 1999 and 2000 testing cycles.
3. Label "**raw score rank**" represents a school's statewide ranking based on **scavg**.
4. Label "**expected scavg**" represents a school's predicted percentage of students meeting or exceeding minimum standards on PACT, controlling for the observed influences of poverty.
5. Label "**difference**" represents the magnitude to which **scavg** exceeds or falls below expected PACT performance.
6. Label "**difference z-score**" represents a standardized measure of deviation from the average observed difference between **scavg** and **expected scavg**.
7. Label "**adjusted scavg**" represents a correction to **scavg** that accounts for the school's level of poverty (**scfreavg**) and the measured affect of poverty on PACT performance (**scavg**).
8. Label "**adjusted rank**" represents a school's statewide ranking based on **adjusted scavg**.



Table 5. Adjusted School Ranking of PACT Performance Accounting for the Effects of Poverty--Rankings 41 - 60

<i>School</i>	<i>District</i>	<i>scfreavg</i> <sup>1</sup>	<i>scavg</i> <sup>2</sup>	<i>Raw Score Rank</i> <sup>3</sup>	<i>Expected scavg</i> <sup>4</sup>	<i>Difference</i> <sup>5</sup>	<i>Difference Z-Score</i> <sup>6</sup>	<i>Adjusted scavg</i> <sup>7</sup>	<i>Adjusted Rank</i> <sup>8</sup>
Pee Dee Elem.	Horry	68.3	68.9	290	55.85	+13.09	+1.44	75.22	41
Guinyard Elem.	Calhoun	83.8	61.0	463	48.19	+12.85	+1.42	74.92	42
Jane Edwards Elem.	Charleston	81.3	62.3	436	49.43	+12.82	+1.41	74.90	43
Aynor Elem.	Horry	59.8	72.8	213	60.07	+12.69	+1.40	74.85	44
Cainhoy Elem.	Berkeley	91.9	57.0	562	44.20	+12.75	+1.41	74.79	45
Alexander Elem.	Greenville	85.2	60.1	487	47.49	+12.61	+1.39	74.67	46
Daisy Elem.	Horry	85.2	60.1	485	47.53	+12.58	+1.39	74.65	47
St. Andrews Elem.	Charleston	59.2	72.8	212	60.34	+12.43	+1.37	74.60	48
High Hills Elem.	Sumter 2	60.0	72.1	229	59.95	+12.14	+1.34	74.30	49
Plantersville Elem.	Georgetown	95.2	54.8	599	42.55	+12.23	+1.35	74.26	50
Wellford Elem.	Spartanburg 5	48.8	77.5	129	65.49	+11.98	+1.32	74.19	51
Loris Elem.	Horry	79.6	62.4	431	50.27	+12.08	+1.33	74.17	52
Williston-Elko Middle	Barnwell 29	60.3	71.7	239	59.79	+11.91	+1.31	74.08	53
West Pelzer Primary	Anderson 1	35.6	83.7	61	72.00	+11.69	+1.29	73.95	54
Charles Pinckney Elem.	Charleston	17.4	92.3	9	80.99	+11.31	+1.25	73.65	55
Reuben Elem.	Newberry	74.8	64.1	394	52.65	+11.49	+1.27	73.60	56
Angel Oak Elem.	Charleston	80.7	61.2	459	49.73	+11.52	+1.27	73.60	57
McCants Elem.	Richland 1	92.8	55.3	585	43.78	+11.47	+1.27	73.50	58
Chukker Creek Elem.	Aiken	24.5	88.7	22	77.50	+11.19	+1.24	73.50	59
Pine Street Elem.	Spartanburg 7	23.7	89.0	21	77.90	+11.11	+1.23	73.42	60

1. Label "**scfreavg**" represents the average percentage of a school's students enrolled in free- or reduced-lunch programs, from 1999 and 2000 testing cycles.
2. Label "**scavg**" represents the average percentage of a school's students meeting or exceeding minimum standards on PACT, from 1999 and 2000 testing cycles.
3. Label "**raw score rank**" represents a school's statewide ranking based on **scavg**.
4. Label "**expected scavg**" represents a school's predicted percentage of students meeting or exceeding minimum standards on PACT, controlling for the observed influences of poverty.
5. Label "**difference**" represents the magnitude to which **scavg** exceeds or falls below expected PACT performance.
6. Label "**difference z-score**" represents a standardized measure of deviation from the average observed difference between **scavg** and **expected scavg**.
7. Label "**adjusted scavg**" represents a correction to **scavg** that accounts for the school's level of poverty (**scfreavg**) and the measured affect of poverty on PACT performance (**scavg**).
8. Label "**adjusted rank**" represents a school's statewide ranking based on **adjusted scavg**.

Table 6. Adjusted School Ranking of PACT Performance Accounting for the Effects of Poverty--Rankings 61 - 80

<i>School</i>	<i>District</i>	<i>scfreavg<sup>1</sup></i>	<i>scavg<sup>2</sup></i>	<i>Raw Score Rank<sup>3</sup></i>	<i>Expected scavg<sup>4</sup></i>	<i>Difference<sup>5</sup></i>	<i>Difference Z-Score<sup>6</sup></i>	<i>Adjusted scavg<sup>7</sup></i>	<i>Adjusted Rank<sup>8</sup></i>
Brook Glenn Elem.	Greenville	31.3	85.1	46	74.13	<b>+10.95</b>	+1.21	<b>73.23</b>	<b>61</b>
Scranton Elem.	Florence 3	72.5	64.9	383	53.81	<b>+11.08</b>	+1.22	<b>73.20</b>	<b>62</b>
Hanahan Elem.	Berkeley	38.3	81.6	88	70.70	<b>+10.95</b>	+1.21	<b>73.20</b>	<b>63</b>
Oakwood-Windsor Elem.	Aiken	67.5	67.2	329	56.25	<b>+10.99</b>	+1.21	<b>73.13</b>	<b>64</b>
WE Parker Elem.	Edgefield	69.5	66.3	347	55.29	<b>+10.97</b>	+1.21	<b>73.10</b>	<b>65</b>
EL Frierson Elem.	Charleston	91.7	55.2	587	44.30	<b>+10.91</b>	+1.20	<b>72.95</b>	<b>66</b>
Mitchell Road Elem.	Greenville	32.0	84.4	55	73.81	<b>+10.58</b>	+1.17	<b>72.86</b>	<b>67</b>
Reidville Elem.	Spartanburg 5	28.6	86.0	39	75.47	<b>+10.55</b>	+1.16	<b>72.84</b>	<b>68</b>
Pinecrest Elem.	Greenwood 50	35.2	82.8	75	72.23	<b>+10.55</b>	+1.16	<b>72.81</b>	<b>69</b>
Savannah Grove Elem.	Florence 1	59.5	70.8	264	60.19	<b>+10.62</b>	+1.17	<b>72.79</b>	<b>70</b>
Wren Primary	Anderson 1	21.9	89.2	18	78.77	<b>+10.43</b>	+1.15	<b>72.75</b>	<b>71</b>
Pacolet Elem.	Spartanburg 3	51.7	74.6	175	64.04	<b>+10.55</b>	+1.16	<b>72.75</b>	<b>72</b>
Whittaker Elem.	Orangeburg 5	85.4	57.9	540	47.40	<b>+10.54</b>	+1.16	<b>72.60</b>	<b>73</b>
Deep Creek Elem.	Georgetown	74.9	63.1	418	52.62	<b>+10.49</b>	+1.16	<b>72.59</b>	<b>74</b>
East Aiken Elem.	Aiken	48.3	76.1	155	65.72	<b>+10.35</b>	+1.14	<b>72.56</b>	<b>75</b>
Burton / Pack Elem.	Richland 1	90.7	55.1	590	44.79	<b>+10.32</b>	+1.14	<b>72.36</b>	<b>76</b>
Seaside Elem.	Horry	34.4	82.6	80	72.61	<b>+10.00</b>	+1.10	<b>72.27</b>	<b>77</b>
Annie Burnside Elem.	Richland 1	83.7	58.5	531	48.28	<b>+10.19</b>	+1.12	<b>72.26</b>	<b>78</b>
Blaney Elem.	Charleston	95.8	52.5	632	42.25	<b>+10.20</b>	+1.13	<b>72.22</b>	<b>79</b>
Honea Path Elem.	Anderson 2	51.6	74.1	185	64.11	<b>+9.99</b>	+1.10	<b>72.19</b>	<b>80</b>

1. Label "**scfreavg**" represents the average percentage of a school's students enrolled in free- or reduced-lunch programs, from 1999 and 2000 testing cycles.
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3. Label "**raw score rank**" represents a school's statewide ranking based on **scavg**.
4. Label "**expected scavg**" represents a school's predicted percentage of students meeting or exceeding minimum standards on PACT, controlling for the observed influences of poverty.
5. Label "**difference**" represents the magnitude to which **scavg** exceeds or falls below expected PACT performance.
6. Label "**difference z-score**" represents a standardized measure of deviation from the average observed difference between **scavg** and **expected scavg**.
7. Label "**adjusted scavg**" represents a correction to **scavg** that accounts for the school's level of poverty (**scfreavg**) and the measured affect of poverty on PACT performance (**scavg**).
8. Label "**adjusted rank**" represents a school's statewide ranking based on **adjusted scavg**.

Table 7. Adjusted School Ranking of PACT Performance Accounting for the Effects of Poverty--Rankings 81 - 100

<i>School</i>	<i>District</i>	<i>scfreavg</i> <sup>1</sup>	<i>scavg</i> <sup>2</sup>	<i>Raw Score Rank</i> <sup>3</sup>	<i>Expected scavg</i> <sup>4</sup>	<i>Difference</i> <sup>5</sup>	<i>Difference Z-Score</i> <sup>6</sup>	<i>Adjusted scavg</i> <sup>7</sup>	<i>Adjusted Rank</i> <sup>8</sup>
Redcliffe Elem.	Aiken	52.5	73.6	195	63.65	+9.99	+1.10	72.19	81
LB Nelson Elem.	Richland 2	19.1	89.9	16	80.17	+9.73	+1.07	72.06	82
Kilbourne Elem.	Richland 1	83.0	58.6	528	48.61	+9.97	+1.10	72.04	83
Bookman Road Elem.	Richland 2	22.6	88.1	26	78.42	+9.63	+1.06	71.95	84
Chavis Middle	Williamsburg	84.3	57.8	541	47.95	+9.87	+1.09	71.94	85
Cossa Elem.	Beaufort	34.9	82.0	85	72.37	+9.65	+1.07	71.91	86
Midland Park Elem.	Charleston	86.9	56.6	569	46.70	+9.85	+1.09	71.91	87
Pontiac Elem.	Richland 2	46.4	76.4	146	66.67	+9.68	+1.07	71.90	88
Charleston School of Arts	Charleston	10.5	94.0	5	84.44	+9.53	+1.05	71.89	89
Springdale Elem.	Lexington 2	31.6	83.5	67	73.97	+9.49	+1.05	71.77	90
Jefferson Elem.	Aiken	59.6	69.7	274	60.17	+9.53	+1.05	71.70	91
Millbrook Elem.	Aiken	31.1	83.6	64	74.22	+9.39	+1.04	71.67	92
Harbor View Elem.	Charleston	22.2	88.0	28	78.62	+9.35	+1.03	71.67	93
Branchville HS	Orangeburg 4	62.1	68.3	312	58.91	+9.36	+1.03	71.52	94
Sandy Run Elem.	Calhoun	38.9	79.6	110	70.37	+9.24	+1.02	71.49	95
Hannah-Pamplico Elem.	Florence 2	66.4	66.1	350	56.82	+9.33	+1.03	71.47	96
Lambs Elem.	Charleston	53.4	72.5	220	63.20	+9.27	+1.02	71.46	97
Joseph Keels Elem.	Richland 2	65.0	66.8	338	57.48	+9.30	+1.03	71.45	98
Morton Elem.	Greenville	55.3	71.4	248	62.30	+9.09	+1.00	71.28	99
Orange Grove Elem.	Charleston	32.1	82.7	78	73.74	+8.99	+0.99	71.27	100

1. Label "**scfreavg**" represents the average percentage of a school's students enrolled in free- or reduced-lunch programs, from 1999 and 2000 testing cycles.
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3. Label "**raw score rank**" represents a school's statewide ranking based on **scavg**.
4. Label "**expected scavg**" represents a school's predicted percentage of students meeting or exceeding minimum standards on PACT, controlling for the observed influences of poverty.
5. Label "**difference**" represents the magnitude to which **scavg** exceeds or falls below expected PACT performance.
6. Label "**difference z-score**" represents a standardized measure of deviation from the average observed difference between **scavg** and **expected scavg**.
7. Label "**adjusted scavg**" represents a correction to **scavg** that accounts for the school's level of poverty (**scfreavg**) and the measured affect of poverty on PACT performance (**scavg**).
8. Label "**adjusted rank**" represents a school's statewide ranking based on **adjusted scavg**.

Independent samples T-Tests show that the top-one hundred and bottom-one hundred schools, ranked by their average PACT score adjusted to the statewide mean percentage of students enrolled in free- or reduced-lunch programs, are not explained by significant differences in poverty, as measured by participation in free- or reduced-lunch programs:

Poverty Measure:      **Percentage of Students Enrolled in Free or Reduced Lunch Programs**

Mean: Top-One Hundred Schools—62.41%

Mean: Bottom-One Hundred Schools—59.93%

$T_{calc}$ : 0.73

Significance: 0.47

Conclusion: No significant difference between the top- and bottom-one hundred schools in percentage of students enrolled in free or reduced lunch programs

The lack of a significant differences between the top- and bottom-one hundred schools on the measure of poverty supports the contention that the differences in actual and predicted PACT performance is likely explained by influences arising within the schools. Essentially, it appears that some schools are able to “add value” to the students that come through their doors—the top-one hundred schools are able to work very well with the students and the contexts in which they operate to elicit higher than expected PACT performance. Likewise, it appears that the bottom-one hundred schools do not function as well to generate PACT performance at expected levels.

This method will allow better interpretations of school-level performance on PACT, perhaps addressing the concerns of schools and teachers faced with explaining below-average percentages of students meeting standards on the test. However, additional adjustments are necessary to identify the impacts of poverty to individual student scores-- a piece of information necessary to mitigate potentially inequitable impacts of standards assessments, such as "meet the standards or repeat the grade" policies.

The impacts of poverty on student-level PACT performance can be determined by using mean scale scores as the dependent variable and a participation in free- or reduced-lunch programs as a dummy independent variable . For example, the regression equations for the two student populations are:

$$Y_{\text{expected PACT score, no free lunch}} = \alpha_1 + \beta_1\chi_1 + u_1$$

$$Y_{\text{expected PACT score, yes free lunch}} = \alpha_2 + \beta_2\chi_2 + u_2$$

These regression equations may be combined to allow expected average PACT scores for both sets of students to be determined in a more efficient manner:

$$Y_{\text{expected PACT score}} = \alpha_1 + (\alpha_2 - \alpha_1)D_1 + \beta_1\chi + (\beta_2 - \beta_1)D_2 + u$$

Where:       $D_1 = \begin{cases} 0, & \text{for all students not enrolled in free- or reduced lunch programs} \\ 1, & \text{for all students enrolled in free- or reduced lunch programs} \end{cases}$

$$D_2 = \begin{cases} 0, & \text{for all students not enrolled in free- or reduced lunch programs} \\ \chi_2, & \text{Average PACT scale score for all students enrolled in free- or} \\ & \text{reduced lunch programs} \end{cases}$$

The coefficient  $D_1$  measures the difference in the intercept terms and the coefficient  $D_2$  measures the difference in the slope. Estimation of the comprehensive equation amounts to estimating the two group equations separately, if one assumes that the error terms are essentially equal. If the coefficient  $D_2$  is deleted from the equation, it amounts to allowing for different intercepts but equal slopes, and if the coefficient  $D_1$  is deleted, it amounts to allowing for different slopes but equal intercepts.

Once the parameters for both groups have been determined, adjustments to individual student scores can be made to mitigate the effects of poverty, as measured by participation in free- or reduced lunch programs. This approach addresses, but does not completely answer, the question, "Accounting for the impacts of poverty, how well does this student perform relative to state standards and to his or her peers?" Models for adjusting individual student scores should also include a variable or variables representing the prevalence of poverty within the school, such as the percentage of the student population enrolled in free- or reduced-lunch programs. For example, the impacts of poverty on performance experienced by a student enrolled in free- or reduced-lunch in an otherwise relatively affluent school are not likely equal to those experienced by a student in a school characterized as "high poverty." In fact, research suggests that small populations of poor students may substantially benefit from being in relatively advantaged student bodies through a variety of peer effects.<sup>18</sup>

### **Discussion, Policy Implications and Recommendations:**

There is little doubt that education production in the United States is in need of improvement. Generations of social promotion, low standards, and profound socioeconomic inequity have resulted in achievement gaps, both domestic and international. If we wish to continue our status as the most prosperous nation in the world, providing our youth rigorous education and the necessary resources for success is imperative. Our current tact toward raising standards and increasing accountability is justified but, while holding potential for positive outcomes, requires certain cautions.

Critics of rigidly applied testing standards warn that socio-economically disadvantaged students may disproportionately suffer consequences of results-based policies, resulting in broadened rather than bridged gaps in achievement. A major tenet in the National Education Association's mantra is that "all children can achieve high and rigorous standards." However, even they acknowledge that the tremendous inequity of learning opportunities and resources between poor and affluent students is *the* primary threat to making this ideal a reality, and a sufficient reason to be wary of levying consequential penalties based solely on test scores.<sup>19</sup>

<sup>18</sup> CM Hoxby. "Peer Effects in the Classroom: Learning from Gender and Race Variation." National Bureau of Economic Research, working paper #7867 (2000).

<sup>19</sup> CS Clark. "Will National Standards Improve US Schools?" CQ Researcher. March 11 (1994).

These concerns are warranted here in South Carolina. This research shows that the factor most powerful in explaining performance on our national standards-based Palmetto Achievement Challenge Test (PACT) is school-level poverty. Poverty, measured by the percentage of a school's students enrolled in free- or reduced-lunch programs, shows a profound deflating effect on average test scores. For every two-percentage point increase in students enrolled in free- or reduced-lunch programs at a school, we can expect a one-percentage point decrease in students meeting or exceeding standards on PACT. Consider the magnitude of this effect--for a school with 80% of its students in a free- or reduced lunch program (a figure not at all uncommon here), we can expect 40% of that school's students to fail to meet standards on PACT. Further, if certain policies are enforced here in South Carolina, this would result in 40% of that school's students to be forced to "repeat the grade," thereby greatly increasing their likelihood of eventually dropping out of school. Given the unmistakable negative relationship between poverty and PACT performance, one must question the immediate and long-term social justice of associating such grave consequences to these test scores.

The effects of test performance-based consequential penalties are not limited to students. Schools and districts face takeover by the state if it is determined that their performance is sufficiently poor, and principals and teachers face losing their jobs. Recently the Greenville News reported that some South Carolina school districts are considering suing the state Department of Education to block implementation of the school and district "report card" program, required by state law by the state school accountability law.<sup>20</sup> These school districts argue that they cannot be held accountable for meeting high education standards when they lack financial and other resources necessary for academic improvements, yet further reverberations of poverty's effects in the era of high stakes testing.

To mitigate the potentially socially unjust impacts of high-stakes testing on students, and the unfair penalizing of school faculty and leaders, in poverty-stricken schools, consideration should be given to "opportunity to learn" standards. Education finance is a central issue in "opportunity to learn" standards-setting, which encourages states and localities to target disadvantaged schools with extra funding to ensure financial resources necessary to achieve educational improvements. Obviously, the availability of additional funds presents a substantial hurdle for many states, and the cost of attaining true resource equity would likely prove prohibitive. Absent resource equity, "opportunity to learn" standards should include adjustments to account for the effects of poverty. Critics argue that this would represent a "double standard," and that allowing for lower standards for certain groups represents a denial of opportunity. Dichotomous standards may not in fact be unjust, given the palpable disparity of learning resources and the effect this has on testing outcomes. So long as inequity affects test scores in such a measurable and profoundly debilitating manner, assessment must acknowledge these effects on student performance in the context of testing standards. To penalize a school and its students for poor test performance without acknowledging the effects of poverty is tantamount to "blaming the victims." We can expect similar performance from poor and affluent students alike only when there is no longer a profound negative correlation between participation in free- or reduced-lunch programs and PACT performance.

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<sup>20</sup> JT Hammond. "Districts May Sue to Block Report Cards." The Greenville News. July 21, 2001.

Discussions of education reform typically focus on interventions within the schools, and too often ignore the fact that schools are but one, albeit very important, institution and influence in the educational process. Currently, the discussions focus on factors of education production including reduced class sizes and raising teacher qualifications and pay. A meta-analysis of education production studies calculated the consensus expectation of achievement gains from an increase in per pupil spending of \$500.<sup>21</sup> Assuming an average class size of 25 students and average teacher pay of \$35,000, and additional \$500 per pupil expenditure devoted to reducing class size would improve test scores by approximately 0.04 standard deviation units; spending it on increasing teacher pay would increase scores by approximately 0.16 standard deviation units; and spending it on increased teacher training would increase scores by approximately 0.22 standard deviation units. Investments of an additional \$500 per pupil represents a \$24 billion growth in national spending, and the best case results (0.22 standard deviation units, or approximately 7 percentile points) are not so correspondingly profound.<sup>22</sup>

Learning is a function of schools, and families, and communities, and peer interactions, and various other social, economic, and cultural factors. The author of "A Nation at Risk," a report that proved instrumental in the education standards and testing movement, wrote a decade later that "...we have foolishly concluded that any problems with the levels of academic achievement have been caused by faulty schools," and added that more attention should be given to the many negative influences from outside the school.<sup>23</sup> We continue to undertake school system-oriented models for enhancing education performance, some of them very expensive investments, and to measure their effectiveness, but insufficient attention has been directed toward whether public policies that enhance social and family capital have the additional effect of improving academic achievement. Investments in family and social capital--raising income levels and reducing poverty, improving nutrition, ensuring adequate health and prenatal care, reducing exposure to environmental toxins, delaying age of first child's birth, strengthening of sense of community, and mobilizing community assets and reducing dependence on external solutions to problems--could possibly prove to be more effective and resource efficient in overcoming the effects of poverty on education performance, particularly if they integrated principles of "Asset-Based Community Development."

The presence of poverty and its impacts on academic performance in South Carolina are acute, and innovative ideas and possible solutions need to be discussed, analyzed and tested. South Carolina is investing relatively heavily in education. We rank 20<sup>th</sup> in the nation in terms of pupil per teacher ratio and 33<sup>rd</sup> in terms of expenditures per pupil in public elementary or secondary schools. We also pay our teachers relatively well. Our teachers are paid 138% of the average salary in the state, a ratio which ranks 21<sup>st</sup> in the nation.<sup>24</sup> Despite our investments in school system interventions, several which rank above the national average, measures show South Carolina as performing well below

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<sup>21</sup> R. Greenwald et al. "The Effect of School Resources on Student Achievement." Review of Educational Research, 66(3), pp. 331-396. (1996).

<sup>22</sup> R. Rothstein. "Finance Fungibility: Investigating Relative Impacts of Investments in Schools and Non-School Educational Institutions to Improve Student Achievement."  
[www.financeproject.org/achievement.htm](http://www.financeproject.org/achievement.htm)

<sup>23</sup> T. Bell. "Reflections One Decade After *A Nation at Risk*." Phi Delata Kappan. (1993).

<sup>24</sup> AT LeFevre and RS Hederman, Jr. "Report Card on American Education." American Legislative Council. (2001).

national average on measures of achievement, and some identify South Carolina as the poorest performing state in the country. Clearly, the status quo is not working very well.

The Jim Self Center on the Future will follow-up this research by addressing the question of relative impacts on education achievement of investments in school system factors and factors related to social and family capital. We also invite others to this discussion.