School Size and Its Relationship to Student Outcomes and School Climate

A Review and Analysis of Eight South Carolina State-wide Studies

National Clearinghouse for Educational Facilities

Kenneth R. Stevenson
University of South Carolina
April 2006

Introduction

As many researchers and writers have pointed out, until relatively recently the trend across the country has been to create larger schools through consolidation and restructuring (Cotton, 1996, Howley, 1997). Historically, larger schools have been advertised as providing a more comprehensive curriculum than possible in smaller schools, while reducing per pupil operating costs (Conant, 1956; Cubberly, 1922). As a result, during the past seventy-five years in the United States the number of school buildings has decreased from almost 250,000 to approximately 95,000 (Kennedy, 2003). At the same time the K-12 public school enrollment has risen from about 28,000,000 students to over 53,000,000.

However, a growing body of evidence has accumulated during the past fifteen years that raises significant questions about if larger schools provide better academic outcomes and whether, in fact, when all factors are considered, they are less expensive to operate. After an in depth analysis of previous school size research, Cotton (1996, 2001) concluded that smaller schools produce better academic results and provide a better school climate. Raywid (1999) has further pointed out that studies indicate smaller schools allow more opportunities for students to be involved in co-curricular activities, and offer more personalization and individual attention than larger schools. And, Howley (1996), based on a combination of his own research findings and review of other work on school size, has raised doubt about the cost effectiveness of larger schools. He argues that, though it first appears that larger schools are more cost-effective to operate, if the dropout/graduation rates are taken into consideration, smaller schools actually are more cost efficient.

In truth, though, while much of the featured research on school size during the past decade has touted smaller schools, the issue has not been fully resolved, at least from a research perspective. Several studies conducted in the 1990s have not confirmed that school size is a significant factor in school performance. Caldas' (1993) study of Louisiana's public schools found that the combination of class size, student daily attendance, and school size together accounted for only 3% of the variation in student performance. The strongest predictor of student test achievement was the percentage of students on free and reduced lunch at a school. Lamdin (1995) examined the relationship of student achievement and school size among ninety-one schools in Baltimore. Data from the study confirmed that the socio-economic status of the student body of a school had a significant association with academic achievement. However, there was no relationship between how students performed on the California Achievement Tests in grades one through five and the size of a school.

In a California study Hoagland (1995), controlling for the effects of socio-economic status, studied the relationships among reading, mathematics, and writing performance and school size. Data suggested that in high schools beyond a certain size, students may not do as well in reading performance, and that students in poverty may perform better in reading in smaller schools. However, statistical analysis led the researcher to conclude that no correlation existed between student performance in mathematics or writing and school size. Similar results were found in a study conducted by the Florida Department of Education (1997). The study included nearly 1,500 schools and encompassed elementary, middle, and high school grade spans. The results indicated a marginal but significant relationship between school size and fourth grade reading and eighth grade mathematics performance. However, when expenditures were controlled for, overall, school size was not a predictor of student performance.

Further complicating the discussions of the relationship of school size to student outcomes is the increasing possibility that size effect may be subject to the type of student served by a school. Howley (2001), in his continuing study of the relationship to school size to student outcomes, has concluded that one size may well not fit all. His research suggests that children from economically disadvantaged backgrounds perform better academically when served by small schools. However, students from affluent backgrounds tend to perform better when housed in larger settings.

Finally, another intriguing possibility raised in the research on school size is that neither bigger nor smaller is better, but, instead, and actual ideal size exists between the two. Lee and Smith (1997) analyzed the relationship between high school size and student learning. They used longitudinal data on nearly 10,000 students in approximately 800 high schools. The researchers concluded that analysis of the data supported the conclusion that students performed best in schools ranging in size from 600 to 900.

Obviously, the existing literature and research provide conflicting perspectives on what size schools should be. Because of the inconsistency in findings, it is imperative that the question of what school size best supports and optimizes learning continue to be explored. The remainder of this paper focuses on adding to that body of knowledge with the expectation that more informed policy decisions arise from as comprehensive a data set as can be provided.

Overview of Eight South Carolina Studies

During the past ten years doctoral students and graduate faculty at the University of South Carolina have conducted a series of studies comparing the size of public schools to student academic performance and school climate. These works have examined the topic at all grade span groupings, including elementary, middle, and high school. Findings from the studies, all of which used state-wide data sets, have been varied, reinforcing the growing realization that establishing the ideal size school is much more complex than some research findings and professional opinion have led the educational, policy-making, and lay communities to believe. What follows is a presentation of each of the eight studies, couched within grade span categories. That is followed by a) an overview of the specific findings from three studies regarding the relationship of operating costs per student to school size, b) a summary and discussion of the meaning of the findings within the context of current literature and research on school size, and c) general conclusions that can be drawn from the South Carolina studies.

Elementary School Studies

Four state-wide studies have been conducted during the past decade on the effects of elementary school size. Three of these focused on student academic performance versus school size, while the fourth centered on whether a connection existed between the number of students housed at a school and school climate. As noted in the following summaries, each of the studies produced interesting but somewhat disparate results.

Elementary School Size, Incentive Awards, and Dysfunctional Classification

In the mid-1990s Stevenson (1996) studied two aspects of enrollment size versus academic outcomes among South Carolina elementary schools. He first analyzed the number of times elementary schools across a ten year period received a state incentive award for meeting or exceeding expected student gains on standardized achievement tests. Stevenson then investigated the relationship between elementary school size and the likelihood a school would be declared "dysfunctional" by the state because of poor student academic performance. In both instances he discovered that school size was a factor.

Examination of ten years of state data "revealed a small but significant positive relationship between school student enrollment and number of times elementary schools have won the Incentive Award (Stevenson, 1996, p. 12)." While the average size among the 598 South Carolina public elementary schools studied was 513 students, schools that had won the recognition all ten years averaged 818 students.

Because poverty is such a major factor in South Carolina, Stevenson then analyzed the data across the five poverty categories in which schools were placed by the state at the time of the study. Interestingly, though not statistically significant, the findings indicated that among elementary schools with the highest percentage of students on free and reduced lunch, a negative relationship existed between school size and number of incentive awards earned. Disadvantaged students seemed to do be doing better academically in smaller schools, rather than larger ones.

When Stevenson subsequently examined the relationship between student enrollment and the likelihood of an elementary school being declared "dysfunctional" by the state, he discovered that a statistically significant negative relationship existed. That is, the larger the school, the less probable it would be identified as "poor performing" or "dysfunctional."

Though this initial study into the relationship of school size to student performance in South Carolina elementary schools tended to support the concept that "bigger is better," Stevenson suggested further research was needed. He also hypothesized that, "The true answer as to what makes schools effective probably lies other than with school student enrollment… neither schools that are smaller nor schools that are larger automatically will assure success (p. 14)." Stevenson additionally argued that, because he found at least a small indication that poverty could be a critical factor in the analysis of the school and student performance, the right size school for a student might depend on that student's socio-economic circumstance.

Elementary Facilities Conditions and Student Academic Outcomes

In 2001 Stevenson, while studying the broader topic of the relationship of school facilities conditions to selected student outcomes for the South Carolina Education Oversight Committee, again examined the association between size of elementary school populations and student academic performance. However, this time he used student scores on the state's newly developed Palmetto Achievement Challenge Test (PACT). While size initially appeared to correlate positively with student performance, as measured by the percentage of pupils scoring proficient or advanced on PACT, when the portion of students with free or reduced lunch status was entered as a control variable, the effects of school size disappeared.

Though no direct relationship was found between elementary school size and student achievement in his second study, Stevenson noted that the impact of poverty was so large that the effect of other variables may well have been masked. Approaching 70% of the variation in school performance on

PACT among fourth and fifth graders in both reading and math was related to the percentage of a school's student body receiving free and reduced lunch. The larger the portion of children in poverty served by a school, the fewer the percentage of students who scored proficient or advanced on the state-wide achievement test. Interestingly, the only other variable at the elementary level that consistently added to the predictability of a school's academic achievement was student attendance, though small.

Stevenson concluded from his study: The effects of socio-economic status, social class if you will, are so great and so intertwined with other variables that distinguishing the impact of facilities factors (like school size) from a strictly statistical perspective is challenging. (p. 71)

Elementary School Size, MAT-7 Results, and Emerging Additional Factors

McCathren (2004) extended the study of the relationship of South Carolina elementary school size and student performance by analyzing the results of two years of *Metropolitan Achievement Te*sts, Seventh Edition (MAT-7), for fifth grade students across the state. As part of his research design, McCathren controlled for several factors including pupil-teacher ratios, percentage of students on the free and reduced lunch, amount of teacher experience, level of teacher education, student gender composition, student racial composition of the school, school operating costs, and community setting (rural, suburban, or urban).

McCathren used a stepwise multiple regression to analyze the test data from the 334 PK-5 and K-5 elementary schools throughout the state that comprised the sample. When control variables were in place, he did not find a significant relationship between school size and mean scaled scores in reading or mathematics on the MAT-7. In fact, among all of the variables included in that study, school size was one of the least predicative of student academic outcomes. Instead, McCathren discovered that the greatest predicator of student achievement among fifth grade elementary school students was the percentage of a school's pupils receiving free and reduced lunch. Echoing Stevenson's (2001) earlier findings, as much as 70% of the variability among schools on the MAT-7 could be attributed to level of student poverty. Interestingly, the one other factor that had a statistically significant relationship, though small, to student academic performance in both math and reading in each year studied was average years of professional experience of the teaching corps.

McCathren concluded:…the concept of school size is somewhat nebulous. It actually represents an amalgam of effects rather than just a raw number or a single effect. (Size) is important because it catalyzes conditions in terms of school climate, curricular offerings, student participation in extracurricular activities, student self-concept and self-esteem, teacher-student relationships, home-school relationships, and student opportunities to learn and grow. All of these have important roles to play in determining student outcomes. (p. 208)

Elementary School Climate and Its Relationship to School Size

In 2005 White focused her study on the effects of elementary school size on school climate. She defined school climate indicators to be: the percentage of teachers and students satisfied with the learning environment, social/physical environment, and home-school relations within the schools; the percentage of students identified as gifted and talented; the percentage of students on academic plans; the portion of students on academic probation; the percentage of pupils suspended, expelled, and retained in a given year; student attendance (percent of student body in daily attendance); the percentage of teachers returning from the previous year; the portion of teachers holding advanced degrees; and teacher attendance (percent of faculty in daily attendance). These data are reported on the South Carolina School Report Card produced by the South Carolina Department of Education. To control for other possible intervening factors, White also included the variables of school socioeconomic status (percent of students receiving free and reduced lunch), percentage of students with disabilities other than speech (%SDA), and per pupil operating expenditure (PPE) in her analysis.

Across the 267 elementary schools White studied, in most instances no relationship was found between size of student enrollment and school climate indicators when controlling for SES, operating cost per pupil, and percentage of pupils served by special education programs other than speech. However, two significant positive correlations were in fact identified, even with the three controls in place. White discovered that as elementary school size increased, the percentage of students retained increased as well. Similarly, schools with larger student enrollments were associated with higher percentage of students being suspended/expelled.

As with the Stevenson (2001) and McCathren (2004) studies, White noted in her analysis that student poverty was by far the most significant factor in predicting school results. She concluded: The intent of this study was not to investigate the effect of SES on school climate; however, the findings reaffirm the negative impact of poverty. The statistical results of this investigation revealed that SES had the greatest impact on all of the school climate variables. (p. 159)

Middle School Studies

Three recent state-wide studies have been conducted on the relationship of the size of South Carolina middle schools to student academic outcomes and school climate. Two of these focused on student academic performance versus school size, while the other centered on whether a connection existed between the number of students housed at a school and school climate. As with the elementary studies, findings were varied at the middle school level.

Facilities Conditions Versus Middle School Student Academic Performance

Stevenson (2001), as a part of his earlier referenced study of the relationship of school facilities conditions in South Carolina to selected student academic outcomes, analyzed sixth, seventh, and eighth grade state student achievement results for 2000. He examined data from all schools with any of the three grades for which test data were available. Depending on the grade, the number of schools analyzed ranged from approximately 225 to 290. Variables studied included such factors as age of structure, school size, student poverty, student attendance, and teacher attendance. Regression analysis confirmed what elementary school studies had found. By far, in South Carolina, the percentage of students in poverty served by a middle school was the greatest predictor of how students at that school would do on both the reading and mathematics components of the Palmetto Challenge Achievement Test (PACT). School enrollment (or size) was not a factor at all when the effects of poverty were included in the analysis. In fact, the only other factor beyond overall socio-economic status of a student body that consistently related to student academic performance was student attendance. Though the effect was small, in general the fewer days of school missed by children, the more likely a larger percentage of a middle school's student body would score proficient or advanced on PACT.

The Relationship of Size and Academic Achievement in Middle Schools

A year later Roberts (2002) conducted another study on the relationship of middle school size to student achievement. As with the 2001 Stevenson study, Roberts examined PACT results for grades six, seven, and eight. However, in contrast to the Stevenson study, Roberts only included schools that contained all three middle grades, and only those grades. Thus, his sample of 156 schools was noticeably smaller and more homogeneous in grade span structure than Stevenson's. Further, Roberts defined "academic success" more broadly as the percentage of students at a middle school scoring "basic" or higher. In South Carolina student performance results on the Palmetto Challenge Achievement Test are classified into one of four categories – below basic, basic, proficient, and advanced.

Like all previous studies, Roberts found that the greatest predictor of how a middle school's student population would perform on the state reading and mathematics achievement tests was the percentage of children in poverty served by a school. However, he also found that school size was a factor in predicting how students would perform on PACT in both reading and mathematics. In the Roberts study, though the effect was small, there was a negative, statistically significant relationship between school size and student academic performance at the middle school level, even after taking into account the impact of poverty.

Within the context of Roberts' study, then, smaller middle schools were associated with better academic productivity. That is, a greater percentage of students in smaller middle schools could be expected to score at least "basic" on the Palmetto Achievement Challenge Test than in larger schools. However, Roberts reminded his readers that the impact of size was very small, stating that: "Over 70% of the variation in percentage of students scoring basic or above in ELA (reading) and math on PACT could be related to SES (percent of students in poverty) (p. 72)."

The Relationship of Middle School Climate with School Size

In 2003 Gettys took a different approach to studying the impact of middle school size. She focused on whether a relationship existed between middle school size and school climate in South Carolina. Utilizing data from the South Carolina State Department of Education 2000-2001 School Report Card, Gettys identified 156 middle schools housing grades 6-8. For these schools she obtained their student membership, student poverty index (percent of students qualifying for free/reduced lunch/Medicare), percent of students identified for special education other than speech, and the annual per student operating cost.

Additionally, as indicators of school climate for each of the 156 schools, Gettys identified the percent of teachers and students satisfied with the learning environment, social/physical environment, and home-school relations within the schools; the percent of students identified as gifted/talented, on academic plans, suspended or expelled, and student attendance; and the percent of teachers returning from the previous year and teacher attendance. These data were obtained from the South Carolina School Report Card provided by the South Carolina Department of Education for each school.

Gettys initially found a negative correlation between school size and teacher satisfaction with home-school relations and student satisfaction with the learning environment, social/physical environment, and home-school relations. However, when all three control variables were applied (SES, % of students in special education, and operating expenditures per pupil), the effects disappeared.

Further, with controls in place Gettys was unable to identify any correlations between school size and school climate as measured by the percentage of students identified as gifted/talented, percentage on academic plans, percentage suspended/expelled, student attendance, percentage of teachers returning from the previous year, and teacher attendance.

As with other researchers examining the relationship of school size to various outcome and climate variables, Gettys acknowledged the impact of student poverty on schools. In her study conclusion she stated that "…clearly SES was the strongest predictor of climate. School size was not a predictor of any of the school climate variables" (p. 134).

High School Studies

In addition to the research done on elementary and middle schools, three state-wide studies have been conducted on the relationship of the size of South Carolina high schools to student academic outcomes. Two of these focused on student performance versus school enrollment, while the third sought to build a comprehensive model depicting the relationships among variables that could affect school outcomes, including school size. As with the elementary and middle school studies, findings at the high school level have been varied.

High School Size and Student Performance Using the MAT-7

In her 2001 study Durbin focused on three relationships concerning school size and student achievement. Durbin's population consisted of the 192 South Carolina public high schools in operation at the time of her study. She first analyzed the relationship between the size of South Carolina's public high schools and student achievement in reading, mathematics, and written language as measured by the eleventh grade Metropolitan Achievement Test-Seventh Edition (MAT-7). Durbin included percentage of students on free and reduced lunch as a control factor for the possible effects of poverty. Then, she examined the correlation between school size and per pupil expenditure, again controlling for student poverty. Finally, controlling for the effects of poverty, Durbin analyzed the relationships among school size, per pupil expenditure, and academic achievement.

As with other studies focusing on South Carolina schools, Durbin discovered that the largest predictor of student performance was the percentage of a school's students living in poverty (those qualifying for free and reduced lunch). Her analysis revealed that up to 74% of the variation in student test performance was accounted for with this one variable. However, even after controlling for the large impact of student poverty on test scores, Durbin's examination of the data revealed a statistically significant and positive relationship between school size and student achievement. Regardless of poverty level, students in bigger high schools tended to outperformed those in smaller ones.

High School Size and Student Performance Using SAT Results

In the same year Stevenson (2001) conducted a separate analysis of the relationship of high school size to student outcomes, using SAT scores as the measure of academic performance. As noted earlier, this was part of a larger study examining the relationships of school physical conditions and student performance. There were 168 high schools for which complete data sets were available. Again, student poverty as measured by the percentage of students at a high school qualifying for free and reduced lunch was used as a control variable. In terms of major effect, Stevenson's finding mirrored those of other South Carolina studies. Approximately 60% of the variation in SAT performance across high schools was related to the overall level of student poverty within the schools. While he initially found a statistically significant positive relationship between high school size and student performance on the SAT, when Stevenson controlled for the effects of student poverty that relationship disappeared. He suggested that poverty and its impact were such huge and staggering aspects in the lives of South Carolina students that the effects of other factors, including school size, though likely at work, were rendered virtually undetectable.

High School Size as Related to Both Outcomes and School Climate

In 2003 Crenshaw sought to answer two questions related to high school size. One was, "What are the relationships among school size, student achievement, teacher attendance, teacher stability, teacher perception of school climate, student attendance, dropout grates, and student perception of school climate?" The other asked, "Does school size influence achievement through the effects of nonacademic factors for teachers and students on school achievement?" The sample for her study included 178 public high schools in South Carolina. Crenshaw's outcome measures were those reported by the South Carolina Department of Education's School Report Card.

As with other studies focusing on South Carolina public schools, Crenshaw discovered that poverty was a significant predictor of both performance outcomes and measures of school climate. Though she did find some connection between school size and student achievement, Crenshaw concluded that: The relationship between socio-economic levels and achievement appeared stronger than the relationship between school size and achievement ratings. Schools that obtained higher achievement ratings tended to be larger, but more importantly the more affluent schools tended to be larger. (p. 92)

Crenshaw did provide an intriguing glance into the complexity of studying the effects of school size. After disaggregating the performance outcome and school climate data into two school size categories, and analyzing the data again, she concluded: The factors promoting success in lower socio-economic schools are not necessarily the same as those that promote success in higher socio-economic schools. (p. 105)

School Size and Operating Costs

To this point, the focus of this summary of school size research in South Carolina has been on the relationship of numbers of students enrolled versus student achievement and school climate. However, there is another important factor related to the "bigger versus smaller" school conversation. That is, whether, in a day and time of substantial community resistance to paying education-related taxes, data indicate that school size is related to operating costs. Additional results on this topic from three studies already reported above shed some light on the relationship of size to per pupil expenditures.

White (2005) in her study of South Carolina elementary schools found a strong, negative correlation between school size and per pupil operating expenditures, even when controlling for the effects of poverty. That is, smaller schools in her sample cost significantly more to operate regardless of the percentage of students on free and reduced lunch. Similarly, in Roberts' (2002) study of South Carolina middle schools, data indicated that larger schools were significantly less expensive to operate. However, because he found that smaller schools were associated with higher levels of student performance, Roberts concluded that, "Smaller schools cost more but produce better achievement results (p. 79)." Further, Durbin (2001) found that at the high school level in South Carolina "…as school size increased, per pupil expenditure decreased significantly …even when partialing out the significant SES effect (p. 63)." While the results have varied across studies in regard to the relationship of school size to student academic performance and school climate, all studies have affirmed that at the macro-level of analysis larger schools at all grade spans are less expensive to run when comparing per pupil operating costs.

However, some intriguing sub-themes have emerged related to cost. Stevenson as early as 1996 reported that school size effects may vary among elementary schools depending on the socio-economic level of the student body served. This raises the question of whether larger schools are cost efficient for all categories/types of students.

Further, McCathern found that for two of his elementary samples, "…per pupil expenditures had a significant, positive correlation with student achievement (p. 205). This would seem to indicate that determining the cost efficiency may be much more complex than merely comparing an aggregate cost per student figure against overall size and/or outcomes.

Summary and Discussion of State-wide Studies on School Size

The research findings from the eight studies in South Carolina in a sense mirror the literature reviewed for this paper. That is, the results were varied and, to some extent, conflicting and contradictory. Because of the nature of the studies, seven issues emerge that require discussion and further research.

One: Poverty.

The most intriguing issue raised is the repeated finding across multiple South Carolina state-wide studies that the portion of a school's students who are live in poverty is by far the greatest predicator of both how students will perform academically and how positive the school climate will be. This raises two questions. The first relates to "masking." With poverty level of the student body accounting for as much as three-fourths of the variability in academic outcomes and school climate among schools, can the real effects of school size and other variables be adequately identified at this point in time? The 2001 findings by Stevenson (student attendance) and McCathren in 2004 (teacher experience) indicate that other factors periodically do emerge along with poverty as predictors school success. With this in mind, would school size actually emerge as a predictive factor in student performance and school climate if the exceedingly harsh, huge effects of poverty could be fully controlled?

The second question about the effects of poverty relates to a broader consideration. That is, the repeated confirmation of the tremendous negative impact of poverty on school children implies that student achievement is more than an educational problem. With a majority of children living in poverty from birth to the time they enter school, the question must be asked: Can the effects of such specific technical variables as school size or teacher/pupil ratios be satisfactorily studied until society as a whole more adequately addresses the basic quality of life issues of its constituency.

Two: Differing Results Across Grade Spans.

A second issue raised by the South Carolina school size studies relates to the variations in findings by grade level span. Stevenson (1996) did find some indication that larger elementary schools were more productive academically than smaller ones. And, Durbin (2001) found similar results at the high school level. However, Roberts' (2002) study of middle schools discovered that smaller size was positively related to higher achievement among students in grades six through eight. Such conflicting results raise an interesting question. Is the "ideal size" of a school at least partially related to the grade spans served? For example, is it possible that because of the unique developmental processes through which middle school students are transitioning from childhood to adolescence, these pupils benefit most from a smaller school environment that focuses on nurturing?

Three: Middle School Size Versus Climate.

A third issue raised by the South Carolina studies on school size has to do with what appears to be conflicting findings in regard to middle schools. As noted earlier, Gettys (2003) could discover no relationships between middle school size and school climate indicators. However, Roberts' (2002) study did find that smaller middle schools were associated with better student academic performance, even when controlling for student poverty. This raises two questions. First, as noted above, is school size more important at the middle school level than at others? And, two, since Gettys found no climate factors that differed by school size, what does account for or explain the variation in student performance by school size at the middle school level?

Four: Cost Versus Outcomes.

A fourth interesting issue raised by the studies is the cost versus outcomes quandary. In general, research in South Carolina repeatedly has indicated that larger schools are significantly cheaper to operate. Even Roberts (2002), though he found smaller middle schools to produce better results, discovered that larger middle schools were significantly less expensive to run. However, disaggregated analysis of data, such as conducted by McCathern (2004), indicates that at least

in some schools, higher operating expenditures are associated with better math and reading scores. Is it possible that for students in high poverty, smaller schools, which on average require greater per pupil operating dollar expenditures, are in effect cost efficient? That is, if smaller schools tend to keep poor children in school longer, prepare them more fully academically, and generally better fill their personal needs, might not the upfront cost be offset by the efficiency of not having such students drop out?

Five: Elementary Climate Factors.

White in her 2005 study of elementary schools found few differences in school climate across schools of all sizes. However, the differences she did discover are intriguing and certainly beg for further study. White's research found that larger elementary schools tended to a) suspend/expel greater percentages of students and b) retain more children than in smaller schools. This raises the question of whether larger schools are less "personal" in their dealings with students, and how this affects students over time?

Six: Differing Measures of Outcomes.

As a quick review of the literature will attest, some of the results of the South Carolina studies are different from those done in other settings. Interestingly, the results within South Carolina have been varied as well – even when using the same sample set. This is an important point to consider when reviewing all of the literature on the effects of school size. Studies often use different measures to study how size of enrollment relates to student learning. For example, at the high school level in South Carolina, Stevenson (2001) used SAT scores as the measure academic achievement while Durbin (2001) employed a study design that measured student success by analyzing MAT7 results. And, at the elementary level McCathren (2004) used multiple years of MAT7 data in his research on size while Stevenson analyzed state designations of success (incentive award winners and dysfunctional school classification) in his 1996 work and state achievement test data (PACT) for a specific academic year in his 2001 study.

These variations raise concern about comparability of results across studies and whether definitive conclusions can be raised based on the research available. There is no doubt that use of differing research approaches adds to the body of knowledge regarding the effects of school size. However, comparison across these in-state studies, much less across studies in multiple states, should be done with caution. When reviewing the literature on school size effects, the question must be asked: What is the outcome measure used to assess school success in a particular piece of research and is that measure one that has validity within the context of a specific community, region, and/or state?

Seven: South Carolina Findings Versus Other States.

Finally, the question certainly has to be asked, "Why have the South Carolina studies tended to find that smaller is not necessarily better - when much research in other states has supported the small schools movement? One problem has to be that there is no standard definition of small school versus large school. In South Carolina the elementary schools average about 525 students (McCathern, 2004), middle schools about 695 students (Roberts, 2002), and high schools approximately 940 students (Crenshaw, 2003). In other settings, these average sizes may be viewed as relatively small – or overly large. Said differently, the findings in the South Carolina studies (as well as other places) must be viewed in the context of relative size. For example, a "small" school in one setting may be a "big" school in another. Thus, while the South Carolina studies add to the body of knowledge related to the effects of school size, they must be considered within the school size context in which they were done.

Further, how schools are staffed and funded varies significantly across states. In effect, a large elementary school of 900 in one state may well provide smaller class sizes, greater numbers of guidance personnel and tutors, more cutting edge technology, and higher per pupil operating funding than a school of 300 in another state. Therefore, while size itself may be important, there are so many variations in other factors affecting quality and quantity of education from state to state that findings in one state may not fully apply to another.

Concluding Thoughts

What size should a school be to optimize learning and teaching -- while striving for cost efficiency in operation? At least in South Carolina, after numerous studies, the answer is yet to be found. While on the surface it first appears that, with rare exception, smaller schools don't produce better results and cost more to operate, closer observation reveals that the issue is much more complex. In South Carolina smaller middle schools appear to produce better student outcomes. And, at the elementary and high school levels, even where bigger appears better, there is evidence that results can vary significantly depending upon the children served. Further, poverty has such a dramatic effect on school outcomes in South Carolina that possible influences of other variables such as school size are possibly masked. Based on the studies to date the only logical conclusion that can be reached is that finding the "ideal" school size is at least elusive, and possibly so complex that an "absolute ideal" does not exist. However, the findings from the South Carolina studies supply sufficiently intriguing data to suggest further study of school size is warranted.

References

Crenshaw, M. (2003). *The relationships among school size, school climate variables, and achievement ratings in South Carolina high schools: A conceptual model.* Unpublished doctoral dissertation, University of South Carolina, Columbia.

Caldas, S. J. (1993). Reexamination of input and process factor effects on public school achievement. *Journal of Educational Research, 86*(4), 206-214.

Conant, J. B. (1959). *The child, the parent and the state.* Cambridge, MA: Harvard University Press.

Cubberley, E. (1922). *Rural like and education: A study of the rural-school problem as a phase of the rural-life problem.* NY: Houghton-Mifflin.

Cotton, K. (1996, December). Affective and social benefits of small-scale schooling. *ERIC Digest*. Clearinghouse on Rural Education & Small Schools (EDO-RC-96-5).

Cotton, K. (2001, December). *New small learning communities: Findings from recent research*. Portland, OR: Northwest Regional Education Laboratory.

Durbin, M. K. (2001). *The relationship of high school size, student achievement, and per pupil expenditures in South Carolina.* Unpublished doctoral dissertation, University of South Carolina, Columbia.

Florida Department of Education. Office of Policy Research. (1997, May). *The relationship of school size and class size with student achievement in Florida*. [Online]. Available: http://ericps.ed.uniuc.edu/npin/pnews/pnew696f.html

Gettys, J. M. (2003). *The effect of school size on school climate variables in middle schools of South Carolina.* Unpublished doctoral dissertation, University of South Carolina, Columbia.

Hoagland, J. P. (1995). *The effect of high school size on student achievement as measured by the California Assessment Program.* Unpublished doctoral dissertation, University of LaVerne, Claremont.

Howley, C. (1996). *Sizing up schooling: A West Virginia analysis and critique.* Unpublished doctoral dissertation, West Virginia University, Morgantown.

Howley, C. (1997). Dumbing down by sizing up: Why smaller schools make more sense -if you want to affect student outcomes. *The School Administrator, 54*(9), 24-36, 28, 30.

Howley, C. (2001). Research on smaller schools: *What education leaders need to know to make better decisions (ERS Informed Educator).* Arlington, VA: Educational Research Service.

Kennedy, M. (2003, June). History in the making. *American School & University*, *75*, 1-10. Retrieved March 14, 2005, from EricEbsco database.

Lamdin, D. J. (1995). Testing for effect of school size on student achievement within a school district. *Education Economics, 3*, 33-42.

Lee, V. and Smith, J. (1997). Which works best and for whom? *Educational Evaluation and Policy Analysis, 19*(3), 205-227.

McCathern, D. A., Jr. (2004). *The relationship between prek-5 and k-5 elementary school size and student achievement of grade 5 students on the MAT7 in South Carolina for the school years 1996-97 and 1997-98.* Unpublished doctoral dissertation, University of South Carolina, Columbia.

Raywid, M. (1999). Current literature on small schools. Charleston, WV: ERIC Reproduction Service No. ED42049.

Roberts, J. E., III (2002). *The relationship of public middle school size, student achievement, and per pupil expenditures in South Carolina.* Unpublished doctoral dissertation, University of South Carolina, Columbia).

Stevenson, K. R. (1996). Elementary school capacity: What size is the right size? *CEFP Journal, 33*(4), 10-14.

Stevenson, K. R. (2001). *The relationship of school facilities conditions to selected student academic outcomes: A study of South Carolina public schools*. Columbia, SC: University of South Carolina, Department of Educational Leadership and Policies.

Roberts, J. E., III (2002). *The relationship of public middle school size, student achievement, and per pupil expenditures in South Carolina.* Unpublished doctoral dissertation, University of South Carolina, Columbia).

White, S. M. T. (2005). *The relationship of school size and school climate in public elementary schools in South Carolina.* Unpublished Doctoral Dissertation, University of South Carolina, Columbia.

Additional Information

See the NCEF annotated bibliographies *School Size/Small Schools*, online at http://www.edfacilities.org/rl/size.cfm and *Impact of Facilities on Learning,* online at http://www.edfacilities.org/rl/impact_learning.cfm.

Availability

NCEF publications are available online at http://www.edfacilities.org/pubs/.