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ABSTRACT

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WAKE COUNTY PUBLIC SCHOOL SYSTEM

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SCHOOL SIZE: A REVIEW OF THE LITERATURE

Amy Overbay (919-850-1863)

ABSTRACT

Many discussions of school size tend to concentrate on secondary sources, such as other literature reviews; although this review does examine some secondary sources, it focuses on empirical research. Recent research suggests that smaller schools may be linked to improved attendance and participation in school activities. Some studies claim that smaller schools may also be associated with higher achievement, although other studies indicate that school size does not have a significant impact on student performance, and cite other variables such as district and school affluence as more reliable predictors of achievement. In fact, some studies suggest that students in more affluent districts may benefit from larger schools. Given the lack of consensus in the field over these issues, as well as practical issues related to rapid growth, limited funds, and the cost-effectiveness of smaller schools, many administrators and policy-makers may prefer to pursue alternative reforms. It may be possible to achieve the desired student outcomes by reorganizing school populations, or by creating smaller learning communities within existing facilities.

INTRODUCTION

The trend towards increasing school size represents one of the most important educational reforms of the twentieth century. Whereas in 1900, the one-room schoolhouse model still prevailed in many areas of the country, U.S. Department of Education statistics show that in 2000, the average U.S. high school enrolled 752 students, the average middle school enrolled 595, and the average elementary school enrolled 446 (Hoffman, 2002). Wake County schools tend to be considerably larger than the national average. As of October, 2002, the average WCPSS high school enrolled 1,776 students, the average middle school enrolled 967, and the average elementary school enrolled 613.[1] In WCPSS, rapid population growth has contributed to the presence of larger schools, though some widely recognized reasons for this national trend involve issues of cost, curricular comprehensiveness, and the need to desegregate schools along racial and socioeconomic lines.

[1] These figures do not include alternative schools, which have abnormally low enrollments. Additionally, only 75% of the total enrollment for year-round schools (8 elementary, and 3 middle schools) was factored into calculations, because only 75% of enrolled students attend these schools at any given time.

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Recently, larger schools have received a substantial amount of criticism, including charges of greater bureaucracy and lack of intimacy (Oxley, 1997), and lack of student engagement (Cotton, 1996). These criticisms justify a careful consideration of the potential merits of smaller schools, and the major issues surrounding the debate over school size: cost, optimal size, student outcomes, and alternative reform efforts. At the heart of the debate over size are the twin issues of optimal size and potential benefits—how large is too large? What potential benefits, if any, may smaller schools offer students?

COST

The question of cost, or "economy of scale," represents a major theme in the literature on smaller schools. In fact, the trend towards school and district consolidation has been chiefly motivated by the argument that larger organizational units are more cost effective, offering a broader range of curricula with lower per-pupil expenditures. As a major figure in early debates over the merits of larger schools, Conant (1959) contended that "The enrollment of many American public high schools is too small to allow a diversified curriculum except at exorbitant cost" (p. 77). Though his vision of the ideal high school size only included 100 students per graduating class, a small school by today's standards, Conant's argument about the relationship between larger schools and a low-cost, comprehensive curriculum provided grounds for the policy shift toward larger schools.

Although some researchers have challenged this claim (Monk & Haller, 1993), the ability of larger schools to offer more types of courses at lower per-pupil costs remains a major justification for larger schools. Even small-school proponents have conceded that smaller schools rarely cost less. As Steifel et al. (2000) noted, "There is no evidence from the body of cost studies we examined that small schools cost less per pupil than those with enrollments of around 900" (p. 30).

However, some researchers offer a different definition of cost, arguing that higher dropout rates occurring within large schools can mean "that small academic high schools have budgets per graduate similar to those of large schools (greater than 2,000 students)" (Steifel et al., 2000, p. 36). It is difficult to establish cross-district comparisons of cost-effectiveness given the unique characteristics of different school districts; for example, the four-year graduation rate of the urban high schools in Steifel et al.'s study was only 50%. Nevertheless, the argument that smaller schools may be more cost-effective warrants an examination of claims about optimal school size and the benefits smaller schools may offer.

OPTIMAL SIZE

Educational researchers vary substantially in their claims about how small schools should be. Classic texts such as Goodlad's *A Place Called School* call for schools no larger than 500 to 600 students (1984, p. 310), a view echoed by practitioners such as Deborah Meier (1995), who have defined small schools as enrolling no more than 300.

More systematic studies of school size suggest that optimal school size may be larger than such anecdotal accounts suggest. One seminal review of literature indicated that school expenditures and optimal size reflect a U-shaped pattern, with the very smallest and very largest schools showing diseconomies of scale (Fox, 1981), suggesting that moderately sized schools may operate most efficiently and effectively. More recent studies examining student outcomes and optimal size also reflect this same pattern. After examining 9,812 sets of records for the same students across grade levels, Lee and Smith (1997) found a curvilinear relationship between high school size and achievement. According to their findings, high school achievement rises as enrollment rises to 600, remains steady up to about 900, and then drops with increasing school size.

The most recent metanalysis of production-function studies (Andrews et al., 2002) resonates with these findings, indicating that high schools above 1,000 students and elementary schools above 600 students may experience diminishing returns; that is, student performance and school services appear to decline relative to increasing inputs (e.g. the number of teachers, administrators, and support staff). Thus, some available evidence suggests that schools can be *too* small, but that some schools (high schools, especially) may be too large. Still, Andrews et al. caution readers that methodological oversights in many available studies can make comparing their results somewhat problematic.

The following table provides a brief overview of the findings of some frequently-cited studies investigating the issue of optimal school size. Because many of these studies failed to control for school location, student and/or district socio-economic status (SES), per-pupil expenditures, or other variables, it is important to consider their results in light of their methods and limitations. Whether or not controlling for these factors may have changed the results of these studies is unknown. However, the subsequent discussion examines issues related to school size and student outcomes, addressing the claims of researchers on both sides of the debate.

Table 1. Studies of Optimal Size

Study	Sample	Variables/Method	Main Findings	Limitations
Andrews (2002)	12 cost & production-function studies.	Metanalysis of 10 "best" cost studies, & 12 "best" production-function studies of school size.	Moderately sized elementary schools (300-500) and high schools (600-900) may optimally balance costs and benefits.	Author notes that many of the studies reviewed had methodological problems involving a lack of information on costs.
Eberts KeyHole & Stone (1984)	287 elementary schools.	Dependent variable: achievement scores. Independent variables: school size, & student, teacher, principal, & school-climate characteristics.	School size in small (under 200) and medium (400-600) elementary schools had little impact on student performance; however, performance declined significantly as enrollment topped 800.	Did not control for school location (urban, suburban, rural).
Fox (1981)	Cost-benefit studies.	Review of research.	Cost curve was U-shaped; smallest and largest schools cost the most. The cost-minimizing size for urban high schools was above 1,000 pupils.	Author notes that unique district characteristics such as transportation costs and the quality of education provided may complicate this pattern.
Lee & Smith (1997)	9,812 sets of student records from 789 high schools.	Dependent variable: reading and mathematics achievement. Independent variables: school size & SES.	Students in high schools smaller than 600, and larger than 900 experienced lower scores; this effect was stronger for schools with higher concentrations of low-SES students.	Did not account for school input data (e.g. counts of teachers, support staff, and classrooms), which suggests that their data could be biased.
Lindsay (1982)	14,668 students in 328 elementary schools.	Dependent variables: extracurricular participation rates, student satisfaction, & attendance. Independent variable: school size, SES, student ability, & location.	Schools with 100 pupils or less in both urban and rural areas had higher extra-curricular participation rates, student satisfaction, and attendance, controlling for SES and ability.	Did not include a variable for suburban schools, but instead pooled results for urban and suburban schools.
Monk & Haller (1993)	Data from 682 New York state public high schools.	Dependent variable: High school course offerings. Independent variables: school size, location, unionized/non-unionized, graduating class size, average SES.	In both urban and rural locations, high schools with 100 students per graduating class were large enough to offer an "adequately diversified" curriculum.	Did not include a variable for suburban schools. Additionally, curricular diversity was defined as the "total number" of academic and vocational offerings, and did not take into account issues of quality.
Steifel, Berne, Iatarola & Frucher (2000).	121 New York City high schools.	Dependent variables: 4-year graduation rates, budget/ graduate. Independent variables: School size, SES, Limited English proficiency & special education rates, & Regents Exam math pass rate.	The researcher defined "small" high schools as <600, "Medium" schools as 600-2000, & "Large" high schools as >2000. Small & large schools had similar budgets per graduate, while "medium" sized schools had the largest budgets per graduate.	Urban focus of study may have skewed results; the average 4-year graduation of schools in sample was only 50%, and the poverty rate was 45%. Sample was also relatively small; only 19 "small" schools included in sample.
Wendling & Cohen (1981)	1,021 New York State elementary schools.	Dependent variables: reading and math achievement. Independent variables: size, teacher-pupil ratios, SES, & years of parental schooling.	High-achieving schools had a mean size of 447 students, and low-achieving schools had a mean size of 776 students. Controlling for SES, school size had a negative effect on achievement.	Examined effects of school size on third grade achievement only.

STUDENT OUTCOMES

School climate and student engagement

Studies of small schools tend to operationalize "smallness" somewhat differently, and cast the issue in relative terms. Even so, proponents of smaller schools consistently cite evidence that the more intimate environment of smaller schools increases student engagement. In one of the earliest studies of the differences between large and small-school environments, Barker and Gump (1964) indicated that smaller schools offer students more opportunities for involvement and interaction. Studies conducted over the past two decades tend to affirm Barker and Gump's argument, suggesting that students in smaller schools have better attendance, feel safer, experience fewer behavior problems, and participate more often in extracurricular activities (Fowler, 1995; Lee & Smith, 1993, 1997; Rutter, 1988). Studies have also found that smaller school size is associated with lower high school dropout rates (Fetler, 1989; Pittman & Haughwout, 1987; Toenjes, 1989). Small school advocates argue that there is a strong relationship between smaller schools and better interpersonal relations, as seen in the "evidence of increases in social bonding to teachers and school, self-esteem, academic self-concept, locus of control, and sociocentric reasoning" associated with smaller schools (Rutter, 1988, p. 31).

Achievement

Available information on the relationship between school size and student achievement appears mixed. As early as 1968, Kiesling found a negative relationship between achievement test scores and school size, when controlling for socio-economic differences, though subsequent studies have not consistently replicated these findings. As Cotton (1996) pointed out in her synthesis of 103 studies and reviews, half the research studies on school size find superior achievement in small schools, while the other half find no significant difference between large and small schools.

Research affirming the relationship between smaller schools and higher achievement indicates that smaller schools appear to mitigate the negative effects of poverty (Fowler, 1995; Lee & Smith, 1997). One of the most recent investigations of the hypothesized relationship among achievement, school size, and poverty, Johnson et al.'s (2002) study of school and district size in Arkansas found that the negative effects of school size on achievement persisted across the entire SES range. However, for the quartile of schools with the highest concentration of black students, Johnson et al. claimed that "the negative effects of poverty, size, and the interaction between poverty and size are compounded" (p. iv). This evidence suggests that smaller school size may have a positive impact on student achievement, but may be especially important for populations most at risk for school failure.

The Matthew Project, a systematic investigation of the relationship between school size at all school levels and academic excellence and equity across four states (Georgia, Montana, Ohio, and Texas), found that the strength (or effect size) of the relationship between school size and academic excellence varied substantially across communities, depending on their relative affluence. Summarizing the results of this project, Howley et al. (2000) noted that "the influence of size varied by SES level, with size exerting a negative influence on achievement in

impoverished schools" (2000, p.2). These findings indicate that the poorer the community, the smaller its schools should be.

Poverty as Key Predictor of Achievement

Researchers skeptical of the relationship between school size and achievement point to the persistent effect of SES on achievement, regardless of school size, and question the *direct* effect of school size on achievement. Although Fowler and Walberg (1991) ultimately concluded that an inverse relationship exists between school size and student outcomes, of the 23 independent variables entered in their analysis, the one most consistently associated with student achievement "was district socioeconomic status...[and] the second most consistent variable was the percentage of students from low-income families in the school" (1991, p. 197-8). While researchers critical of the small schools movement have investigated other predictors of school success such as home environment (Sares, 1992), the complex association between poverty and achievement has been the pivotal issue in studies that have challenged the claims of small schools proponents.

In fact, some studies have indicated that *larger* school size benefited student performance in higher-SES communities. Howley (1999) noted that while findings from the Matthew Project provided evidence that impoverished communities may need smaller schools, they also suggested that in some higher-SES settings, larger schools may be advantageous: "The Matthew Project data for Ohio (and several other states as well) show that increases in school size benefit achievement in more affluent communities" (p. 21). According to Howley, the effect of school size on pass rates changed from positive to negative in districts where at least 10% of families received federal welfare benefits; in less impoverished areas, the effect of size on pass rates was positive (p. 20).

This finding echoes the results from Friedkin and Necochea's (1988) examination of the relationship between school system size and achievement using data from the California Assessment Program. These authors stated that "positive effects of size on performance may emerge in high SES contexts because in such contexts increases in school system generate opportunities for improved system performance and few constraints on allocation of system resources" (p. 245). Although Howley and Friedkin and Necochea caution readers about making causal inferences about the relationship between district size and achievement, the results from their studies indicated that larger schools and districts can be valuable for some communities.

Other studies have questioned the very existence of the relationship between school size and achievement. For example, in a study of schools in the two largest school districts in Kentucky, Roeder (2002) found that smaller school size had no significant relationship to achievement, when variables for school level (elementary, middle, or high) were added into the prediction equation. Further, Roeder found that smaller school size did not directly reduce the negative effects of poverty on achievement. For elementary schools, the interaction between SES and school level was significant on three of four measures of achievement, suggesting that especially for elementary students, poverty remained the most significant predictor of academic success.

Summarizing his results, Roeder contended that "if an important question for education officials is how to improve performance in large and medium-sized urban/suburban school districts, focusing on school size does not appear to offer answers" (2002, p.17). Instead, equity issues related to student achievement should receive more attention, as should issues related to instructional practice. By addressing these issues, officials may succeed in fostering the kind of equitable and engaging school climate desired by small school proponents.

As Roeder and other researchers suggest, it is difficult to assume a direct link between school size and achievement. Teasing out the precise means by which small schools may benefit students remains a challenge, given the fact that issues of economic equity continue to pose barriers for students in schools of all sizes. In view of the difficulty of identifying a causal relationship between reduced school size and superior student performance, Lee and Smith (1993) encourage us to "interpret the positive findings for small schools as indicating that enrollment size acts as a facilitating or debilitating factor for other desirable practices...Reducing school size, while a potential structural reform in its own right, would not increase student learning per se" (p. 34). As administrators and policy makers look to the future, finding ways to facilitate equal access to education, as well as the use of these "desirable practices" within the context of existing larger schools may represent the more salient challenge.

ALTERNATIVE REFORMS

REDISTRICTING

Alternative reforms at the district level tend to involve the reorganization of school populations. Roeder (2002) claimed that "disputes over school [size] may be costly diversions from the more important issues of disadvantage and equal opportunity" (p.17). According to Roeder, district policy makers and administrators "in urban/suburban districts with many schools and diverse neighborhoods should consider drawing attendance boundaries to distribute poor children more equitably across schools, regardless of school size" (p. 18), in order to address underlying issues related to student performance. This reform has its roots in the era of school desegregation, under the Civil Rights Act of 1964. In the last decade, critics have emphasized the persistence of substantial inequalities in the education received by high and low-income students, and have stressed the continued need to distribute low-income students more equitably throughout school districts (Orfield, 2001). Although this reform effort faces a number of challenges in an era of policy change, it remains one of the primary means of assuring equal access to high-quality educational environments, and supporting the educational experiences of students from disadvantaged backgrounds (Welner, 2001).

SCHOOLS WITHIN SCHOOLS

Alternative reforms at the school level also represent important options for administrators interested in improving learning communities. Given the thorny issue of the cost-effectiveness of small schools, and the difficulty of identifying a direct link between school size and achievement, "a reasonable alternative to building new schools is a movement to create a set of smaller schools-within-schools" (Lee & Smith, 1997, p. 220). Although staffing issues may arise when large schools are divided into smaller units (McAndrews, 2002), there are a number

of variations on this model, from schools-within-schools for specific grades, to the vertical-house plan common in Great Britain, in which entire schools are broken up into "houses," or groups of several hundred students, but share the same facilities and faculty.

This reform effort currently enjoys substantial popularity in many areas. In 2001, the U.S. government began offering grants of up to $50,000 to large schools planning to subdivide (Raywid, 2002), and the Bill and Melinda Gates foundation has committed more than $250 million towards the implementation of this reform in New York City, Philadelphia, and Chicago (Viadero, 2001). In their study of structural reforms and student achievement, Felner and Jackson (1997) provide compelling support for creating smaller learning environments at the middle school level. However, outcome data for this movement remain relatively scarce, so it is difficult to compare the effectiveness of schools-within-schools with that of large schools, or traditional versions of small schools. Most voices in the field recommending this reform, like Goodlad (1984), argue it "on curricular grounds and on the basis of students' personal welfare," (p.310), not necessarily on the grounds of empirical achievement data. Nevertheless, this reform has garnered considerable national attention, and represents a viable alternative for districts that may be unable or unwilling to invest in smaller schools.

CLASS SIZE REDUCTION

Many researchers also identify class size reduction as another important alternative reform measure. Advocates of this reform point to the greater instructional flexibility and individualization possible within smaller classes, features that can lead to increased student engagement. Evaluations of major class size reduction initiatives, such as Tennessee's STAR project, Wisconsin's SAGE program, and Indiana's Prime Time plan, suggest that students in smaller classes (13-17 pupils) score higher on achievement tests (Finn & Achilles, 1990; Molner et al., 1999, 2000), and have fewer behavioral problems (Finn & Achilles, 1990). Furthermore, evidence suggests that minority students particularly benefit from smaller classes (Finn & Achilles, 1990; Molner et al., 2000). However, evidence also indicates that the benefits of smaller classes may decline after the second grade (Tillitski et al., 1988), suggesting that class size reduction efforts should target students K-2. In 1998, Congress responded to the evidence favoring smaller classes, and allocated funds to reduce class size in the early grades. Currently, class size reduction efforts are underway in many states.

CONCLUSIONS

Recent research suggests that smaller schools may be linked to higher student engagement. Some studies claim that smaller schools may also be associated with higher achievement, although other studies indicate school size does not have a significant impact, and cite other variables such as district and school affluence as more reliable predictors of achievement. Given the lack of consensus in the field over these issues, as well as practical issues related to rapid growth, limited funds, and the cost-effectiveness of smaller schools, many administrators and policy-makers may prefer to pursue alternative reforms. One district-level alternative reform involves reorganizing school populations by redistributing low-income students across schools. At the school level, it may be possible to achieve the "desirable practices" of smaller schools by reshaping the school and/or classroom environment, while maintaining existing facilities and

infrastructures. Two of the most promising school-level reforms include schools-within-schools and class size reduction. Although more empirical evidence is needed on the national and local levels to clarify the effects of such reforms, they may represent important options for districts seeking alternatives to creating smaller schools.

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