

spotlight

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WAKE COUNTY'S EDIFICE COMPLEX

Extravagant School Buildings Do Not Lead to Higher Student Achievement

S U M M A R Y : **Contrary to the claims of school officials and community leaders in Wake County, students do not necessarily perform better in schools that have fewer mobile units or temporary classrooms, more square feet per student, and more acreage. This finding is consistent with national and international research that found no consistent relationship between school facilities and learning. The Wake County Public School System can scale back their multi-billion construction and renovation plans without harm to student learning.**

Like their peers in many school districts in North Carolina, Wake County schools officials believe that there is a strong correlation between the quality and size of school buildings and student performance.¹ They often justify spending more on school buildings and buying larger pieces of land because they assume that these trimmings will improve student performance. At the same time, parents and community leaders urge taxpayers to consent to such expenditures, believing that the future of the local public school system is at stake.² Nevertheless, the belief that school buildings have a significant effect on student performance lacks empirical evidence.

Is there a positive correlation between student performance and school facilities? Fortunately, this is a testable hypothesis. Statistical analyses confirm that mobile units, square feet per student, and acres per student do not positively correlate to higher composite test scores.³ Anecdotally, there is no evidence that charter, private, and home school students suffer academically when classes are conducted in smaller learning environments with fewer amenities. If the same is true for public schools, this means that a school district could scale back costly construction and renovation plans without harm to student learning, saving taxpayers millions of dollars and keeping taxes low.

Wake County School Buildings and Student Performance

Many believe that students perform worse when schools use mobile units for instruction. School officials use this sentiment to spearhead efforts to reduce the number of temporary classrooms by suggesting that mobile units are dismal and depressing learning environments. Despite these claims, schools

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Table 1. Wake County Schools with the Most Mobile Units (By Grade Level)⁴*Question: Do mobile units decrease student performance?*

School	Mobile Units	2004-2005 Composite Pass Rate	Meets/Exceeds Median Pass Rate
<i>ELEMENTARY SCHOOL MEDIAN</i>			
	4	91.0	
Fox Road Elementary School	18	83.9	
Wakefield Elementary School	14	94.5	✓
Olive Chapel Elementary School	14	94.0	✓
West Lake Elementary School	14	92.9	✓
Durant Road Elementary School	14	91.6	✓
<i>MIDDLE SCHOOL MEDIAN</i>			
	4	88.9	
Durant Road Middle School	15	91.5	✓
West Lake Middle School	12	95.2	✓
Wake Forest-Rolesville Middle School	11	87.9	
Leesville Road Middle School	10	92.3	✓
Davis Drive Middle School	9	94.6	✓
<i>HIGH SCHOOL MEDIAN</i>			
	8	82.9	
Millbrook High School	54	78.2	
Broughton High School	20	82.9	✓
Apex High School	20	91.0	✓
Enloe High School	19	84.1	✓
Southeast Raleigh High School	12	80.2	

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with many mobile units do not necessarily produce low-performing students (see Table 1). Of the five elementary, five middle, and five secondary schools with the most mobile units in the school district, eleven (73 percent) had average test scores that were higher than the district median scores for their respective grade ranges

There is also no apparent evidence that spacious schools increase student performance. School districts claim that student performance will suffer when hallways and classrooms are at or above student capacity. Yet of the five elementary, five middle, and five high schools with the most square feet per students for their grade levels, only five schools (33 percent) had average test scores that were higher than the district median scores (see Table 2). In other words, schools that afforded students more space, because of either large buildings and/or small enrollments, did not necessarily improve student performance.

In addition, Wake County school officials argue that school construction costs are higher in Wake County compared to those of surrounding counties because the school district buys and develops larger pieces of land. They claim that academic, extracurricular, and athletic programs necessitate this. Nevertheless, of the five elementary, five middle, and five high schools with the most acres per student, only four (27 percent) had average test scores that were higher than district median scores (see Table 3). The additional acreage required for these academic and extracurricular activities did not necessarily lead to higher student performance.

Research on School Environment and Student Learning

According to the research literature, school building environments have few effects on student learning. In 2005, five researchers from England attempted to determine which environmental factors had the greatest effect on education. They carefully reviewed over 200 research articles spanning 95 years and addressing school construction practice in England, the United States, and Europe.⁷ The review found that:

- There is strong, consistent evidence for the effect of basic physical variables (air quality, temperature, noise) on learning.

Table 2. Wake County Schools with the Most Square Feet per Student (By Grade Level)⁵*Question: Do more square feet per student increase student performance?*

School	Square Feet per Student	2004-2005 Composite Pass Rate	Meets/Exceeds Median Pass Rate
<i>ELEMENTARY SCHOOL MEDIAN</i>			
Kingswood Elementary School	193.7	91.8	√
Joyner Elementary School	174.0	85.5	
Lynn Road Elementary School	172.9	85.1	
Zebulon Elementary School	171.6	83.9	
Wiley Elementary School	167.2	84.8	
<i>MIDDLE SCHOOL MEDIAN</i>			
Moore Square Middle School	271.4	83.5	
Centennial Middle School	262.7	88.1	
Carroll Middle School	248.5	88.7	
Fuquay-Varina Middle School	190.4	86.1	
Salem Middle School	180.8	95.3	√
<i>HIGH SCHOOL MEDIAN</i>			
Knightdale High School	271.5	77.2	
East Wake High School	229.8	68.5	
Athens Drive High School	154.5	89.2	√
Leesville Road High School	147.6	88.8	√
Sanderson High School	145.5	82.9	√

Table 3. Wake County Schools with the Most Acres per Student (By Grade Level)⁶*Question: Do more acres per school increase student performance?*

School	Acres/Student	2004-2005 Composite Pass Rate	Meets/Exceeds Median Pass Rate
<i>ELEMENTARY SCHOOL MEDIAN</i>			
Zebulon Elementary School	.052	83.9	
Penny Road Elementary School	.048	88.6	
Fox Road Elementary School	.043	83.9	
Rand Road Elementary School	.042	92.2	√
Timber Drive Elementary School	.042	93.4	√
<i>MIDDLE SCHOOL MEDIAN</i>			
East Wake Middle School	.059	83.0	
East Millbrook Middle School	.045	82.8	
Salem Middle School	.040	95.3	√
Wake Forest-Rolesville Middle School	.038	87.9	
Carroll Middle School	.037	88.7	
<i>HIGH SCHOOL MEDIAN</i>			
Knightdale High School	.080	77.2	
East Wake High School	.053	68.5	
Middle Creek High School	.042	78.6	
Garner High School	.033	68.2	
Green Hope High School	.032	91.7	√

- Once minimal standards are attained, evidence of the effect of changing basic physical variables (such as classroom size and layout) is less significant.
- There is conflicting evidence on the effects of lighting and color.
- Other physical characteristics affect student perceptions and behavior, but it is difficult to draw definite, general conclusions.

In other words, the only consistent finding was that students did not learn well in school environments that did not have clean air, moderate temperatures, and relatively little noise. This is common sense. The research does not agree that structural features (classrooms, corridors, building size, etc.), aesthetic features (color, architecture, etc.), and auxiliary features (athletic facilities, specialty classrooms, etc.) had significant effects on student learning.

These findings are consistent with evaluations of school systems from around the world. For a number of years, the North Carolina Public School Forum and The North Carolina Center for International Understanding at UNC-CH have co-authored a series of reports about schooling in Asia and Europe. Several of these reports provided a first-hand account of the types of school buildings used by nations with exemplary student performance on international assessments.

When it comes to school facilities around the world, the reports say the same thing time and time again – students perform just as well in small and plain school buildings as they do in extravagant ones. According to a report of education in South Korea,

As previous International Studies delegations observed in Japan, England, and The Netherlands, the United States has a different concept toward facilities and supplies than do other nations in which students are high performing. As in the other countries, school facilities in South Korea are, for the most part, very unimpressive. They do not have large open areas; the architecture is uninspiring. They are, however, well maintained and clean.⁸

The “different concept” of American school buildings includes school buildings that are larger, with more square footage, acreage, and “extras,” than those offered by school systems in other nations. To many international observers, these differences reflect the misplaced priorities of American schools. In a recent report on education in India, an education official declared that their education system is “built with brains, not bricks.”⁹ Clearly, the idea that students need impressive schools buildings to be successful is a delusion unique to our public school systems.

Conclusion

Only an experimental research design, which could assess any number of factors related to student learning, could determine whether school environments produce positive or negative outcomes. The purpose of this paper was to point out that there is no apparent correlation or relationship between particular types of learning environments and student performance. If there is no evidence of a relationship between school facilities and learning, however, then there is likely no causal relationship between the two.

On the other hand, the same cannot be said of teacher quality, which a large body of research suggests is the most important factor for student success. For this reason, school districts should focus on implementing merit pay, school choice, and other measures that would attract the best and brightest to the teaching profession. The most elaborate school building cannot compensate for a mediocre teaching force, but the best teaching force can perform equally well in lavish or simple school buildings. In this way, excessive expenditures on school construction reflect mistaken assumptions and misplaced priorities.

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Notes

1. As former Wake County Schools superintendent Bill McNeal said, "The most important thing to remember is that schools are not in the business of 'housing' students. ... Our schools are learning communities." Wake County Schools, "Growth Matters," www.wcpss.net/growth, Spring, 2006, p. 1.
2. Blue Ribbon Committee on the Future of Wake County recommended that the Wake County Schools "[c]onsider changes in school design that reduce costs but improve efficiency, *as long as academic experience is not impaired*" (emphasis added). Blue Ribbon Committee on the Future of Wake County, "Report of the Wake County Committee on the Future of Wake County [Draft]," May 2006, p. 4. www.wakegov.com/blueribbon/report.htm.
3. The author confirmed all findings using a simple Pearson correlation. The correlation between student performance and mobile units was not statistically significant, suggesting that student performance is unaffected by the number of mobile units or temporary classrooms. There was a negative correlation (-.574, significant at the .01 level (2-tailed)) between student performance and square feet per student, suggesting that student performance increases as square feet per student decreases. There was a negative correlation (-.210, significant at the .05 level (2-tailed)) between student performance and school acreage, suggesting that student performance increases as acreage decreases. In order to assess whether these are spurious correlations, the author conducted a partial least squares correlation that controlled for the free and reduced lunch percentage. In this subsequent analysis, there was a statistically significant, albeit extremely weak, negative correlation (-.2387, significant at the .01 level (2-tailed)) between mobile units and performance. There was also a weak but statistically significant negative correlation (-.4465, significant at the .01 level (2-tailed)) between square feet per student and student performance. Finally, there was no statistically significant relationship between performance and acres per student. The follow-up analysis offered no compelling evidence that these factors had a substantial effect on student performance.
4. Chuck Dulaney, "ABC Outcomes for WCPSS for 2004-2005," August 2005, www.wcpss.net/evaluation-research/reports/report_topics/abc.html. Wake County Schools, "School Information," June 2006, www.wcpss.net/schoolmain.html. Elementary, middle, and high school averages calculated by author.
5. Dulaney, "ABC Outcomes." Wake County Schools Auxiliary Services Division, "School Data from CAFI," May 2006. Square feet per student calculated by author.
6. Dulaney, "ABC Outcomes." Wake County Schools Auxiliary Services Division, "Annual Report: Summary of All Building Programs," October 2005. Wake County, "School Data."
7. Steve Higgins, Elaine Hall, Kate Wall, Pam Woolner, and Caroline McCaughey, "The Impact of School Environments: A Literature Review," The Design Council, February 2005.
8. The Public School Forum and the North Carolina Center for International Understanding, "Learning from South Korea," 2003, p. 14, www.ncforum.org/doclib/publications.
9. The Public School Forum and the North Carolina Center for International Understanding, "Learning from India," 2006, p. 20, www.ncforum.org/doclib/publications.