POLICY REPORT

Feng Shui Schools
Wake County's Unenlightened School Building Program

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John Locke FOUNDATION

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Executive Summary

The most critical challenge facing Wake County Public Schools is to find the most responsive, cost-efficient, and timely way to provide seats for a growing student popu lation. In this regard, the school system's proposed $1.056 billion school facilities spending plan falls short.

Wake County's school building renova tion projects do little to increase the capac ity of the thirteen schools slated for major renovation. It will increase square footage by 236,300 square feet and add 2,096 seats, equivalent to the size of one high school. The $245 million renovation plan will use about one-fourth of the 2006 bond funds to renovate thirteen schools, but it will only yield enough seats to accommodate 1/15th of the new students projected to be added over the four-year life of the bond.

As for construction funding, the best way to finance debt is to issue bonds rather than certificates of participation (COPs). The best way to pay for schools, however, is to use pay-as-you-go funding. In upcoming years, Wake County will spend hundreds of millions of dollars on annual interest payments on debt for school construction. By dedicating existing revenue streams for school facilities, the county would be able to use more money to build schools and less money to pay debt service.

High-growth school systems cannot avoid using bonds or COPs to pay for some of its school construction programs, but such debt should not force a county to raise taxes or impose special fees. Before bonds or COPs are even considered, the priority for the school system should be to redi rect funds away from low-priority projects, reduce the size of the school bureaucracy, reduce construction costs, use existing rev enue streams, and implement alternatives.

Between 1996 and 2003, the Wake County Schools employed few alternatives to accommodating enrollment growth. Clearly, stress on current school capacity is a product of the school system's failure to change decades-long practices of financ ing and building schools. Under the Wake County Schools' proposed spending plan, new and renovated schools combined will cost $31,724 per seat, a cost that could be reduced by implementing a comprehensive program of school construction reform.

Put simply, the correct mix of bonds, pay-as-you-go funds, facilities alternatives, and efficient building practices would allow the Wake County Schools to successfully meet the challenges of growth for years to come. This reports recommends the fol lowing ways to improve the $1.056 billion spending plan:

1. Use renovation projects as opportuni ties to simultaneously add seats and address health and safety concerns.

2. Commit to use every school construc tion alternative available, including:

Charter schools
— Adaptive reuse
— Modular schools
— Ninth grade centers
Joint use agreements
Public private partnerships
— Year-round schools of choice
— Learn and Earn/Early College sites
Satellite campuses
Virtual schools

3. Create a pay-as-you-go fund that will decrease the interest paid on debt like bonds or certificates of participation and increase funds available for school facilities.

4. Use efficient school designs that as sign 70 to 75 percent of building space for educational and programmatic activities.

5. Integrate wireless technology into school designs.

6. Build larger schools on less land, and find alternate uses for surplus land.

7. Work to establish more flexible zoning and environmental regulations for school construction.

Feng Shui Schools: The School Building/Student Achievement Myth

Lately, one might get the impression that school construction programs in North Carolina follow the principles of Feng Shui. Feng Shui is the ancient Chinese practice of placement and arrangement of space. Those who practice Feng Shui believe that individuals who dwell in a properly situ ated building will achieve harmony with the environment; that is, they become attuned with the flow of *chi* or spiritual energy. Why else would a Wake County Schools reno vation plan include re-orienting the main campus entry of Lynn Road Elementary to the east?

Indeed, Vedic architects believe that an east facing entrance is important because "energy from the sun is most nourishing when rising, bringing greatest benefits to the health and vitality of the family. [It is also] auspicious, with influences of enlight enment, affluence, fulfillment."[1] By virtue of the way they renovate and build schools, Wake County school officials seem to sug gest that some kind of mystic educational energy will seep into the heads of teachers, administrators, and students, leading to high student performance.[2] In other words, build the right schools and you will produce "enlightened" children.

Of course, critics of the building plan and the means to fund it are often accused of imposing harm on children and the community. These accusations confuse the issue. School construction is, first and fore most, a public policy and finance issue, not an educational one. There is simply no con clusive evidence that school buildings make or break a child's schooling.[3] Two recent research reports highlight this fact well.

Using Wyoming school facilities as a case study, a 2005 *Peabody Journal of Edu cation* article concluded that investments in facilities by themselves are unlikely to improve student learning.

In their literature review, researchers found,

> *Despite the fact that numerous studies have been conducted on how school build ings affect student achievement, there are no conclusive findings. Many of the studies were based on the open schools movement of the 1970s and are no longer relevant to today's schools. Most of the rest were plagued with methodological problems and, not surprisingly, produce conflicting, ambig uous results.*[4]

In addition, five researchers from Eng land recently published a literature review of over 200 research articles spanning 95 years of school con struction practice in the United States and Europe. The re searchers could only determine that basic physical variables (air quality, tempera ture, noise) affected student learning.[5] Although the evidence is remarkably weak, school systems have been remarkably persistent in perpetuating the myth that school buildings improve student performance. Believing the myth to be fact, the public has generously funded multi-mil lion dollar public school construction plans.

A 2005 Peabody Journal of Education *article con cluded that investments in facilities by themselves are unlikely to improve student learning.*

Framing the Debate in Wake County

Wake County is growing, and the schools are growing with it (see Table 1). After five consecutive years (1998-2002) of Aver age Daily Membership growth under four percent per year, the last three years (2003-05) have seen enrollment growth climb to over four percent per year.[6] Interestingly, the net migration of individuals into Wake County has been slower over the last three years than in the previous six years. This suggests that Wake County's future school enrollment growth may be less dependent on the number of people moving into the

Table 1. Overview of Wake County and Wake County Schools[7]

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
School Demographics and Capital Expenditures										
Average Daily Membership (ADM)	84,856	88,511	91,121	94,295	97,348	100,373	103,921	108,396	113,547	119,306[8]
ADM percent increase	5.2%	4.3%	2.9%	3.5%	3.2%	3.1%	3.5%	4.3%	4.8%	5.1%
Capital outlay (in millions of dollars)	$85.7	$114.3	$139.3	$172.5	$146.5	$113.8	$138.8	$172.0	$168.8	$142.0
County Demographics										
Population	550,532	571,852	593,001	612,503	627,866	660,201	679,754	701,052	723,708	746,336
Population percent increase	4.3%	3.9%	3.7%	3.3%	2.5%	5.2%	3.0%	3.1%	2.3%	3.1%
Percent net migration	3.4%	2.9%	2.7%	2.3%	2.3%	3.0%	1.8%	2.0%	2.1%	N/A

county than is popularly believed.

Capital expenditures totaled close to $1.4 billion over the last ten years, averag ing $140 million per year. This included the cost of building new schools, renovat ing existing schools, and providing funds for other repairs and life-cycle replacements. The proposed $1.056 billion school facilities spending plan (including the $970 million bond and $86 million in pay as you go funds) would provide the school system a capital budget that averages $264 million a year over four years. The plan actually spans six years because some funding from this spending plan will be used to pay for start-up of design ($25 million) and land for 13 schools ($33 million) to be built between 2012 and 2013.[9]

If Wake County faces a "crisis" about how to accommodate enrollment growth, then increasing school building capacity must be the school system's first priority.

In the end, the question is not about why people are moving to Wake County or what happens inside the classroom. It is about the best way to provide seats for additional students. If the Wake County Schools is facing a "crisis" about how to accommodate growth, then increasing school building capacity must be the school system's first priority. Thus, one must evalu ate the school system's building plan on its ability to provide seats in a responsive, cost-efficient, and timely manner. In this regard, the proposed $1.056 billion school facilities spending plan falls short.

Wake County's Renovation Plans Add Minimal Capacity

If accommodating growth is a priority, then adding seats should be the primary goal of a school construction plan. School systems can accomplish this goal by building new schools, renovating existing facilities, or both. It is common to think of renovations as a means to correct health and safety problems, enhance the appearance of a facility, or reconfigure space for alternate

Table 2. Overview of Proposed Wake County Renovation Projects[11]

School	Bid Year	Budget[12]	Square Feet (Sq. Ft.) Renovated	Sq. Ft. Added	Sq. Ft. Demolished	Net Sq. Ft. Added	Seats Added	Cost Per Additional Seat
E. Milbrook MS	2007	$29,178,143	58,400	80,600	58,400	22,200	156	$187,039
Lynn ES	2007	$22,142,125	84,900	14,500	0	14,500	174	$127,254
Aversboro ES	2007	$21,288,392	0	87,300	56,100	31,200	246	$86,538
Cary HS	2007	$10,752,136	1,300	51,500	0	51,500	510	$21,083
Martin MS	2007	$9,238,983	0	40,500	27,500	13,000	0	N/A
East Wake HS	2007	$24,107,686	61,400	55,800	15,200	40,600	235	$102,586
Enloe HS	2007	$7,335,208	18,800	0	38,300	-38,300	0	N/A
Poe ES	2008	$14,662,384	50,500	0	0	0	0	N/A
Root ES	2008	$20,746,609	14,300	66,200	33,300	32,900	170	$122,039
Smith ES	2008	$18,658,255	25,300	44,300	30,400	13,900	102	$182,924
Lacy ES	2008	$22,868,752	12,200	64,800	56,300	8,500	115	$198,859
Bugg ES	2009	$21,565,228	53,800	36,700	0	36,700	312	$69,119
Wilburn ES	2009	$22,067,792	24,900	70,100	60,500	9,600	76	$290,366
Totals		**$244,611,693**	**405,800**	**612,300**	**376,000**	**236,300**	**2,096**	**$116,704 (Avg.)**

uses. Nevertheless, renovations and adding seats (capacity) are not mutually exclusive. Major renovation projects should add seats and correct health and safety problems at the same time. When additional seats are needed, school systems should also recon figure inefficient designs and underutilized spaces to maximize the school building capacity for present or future use.

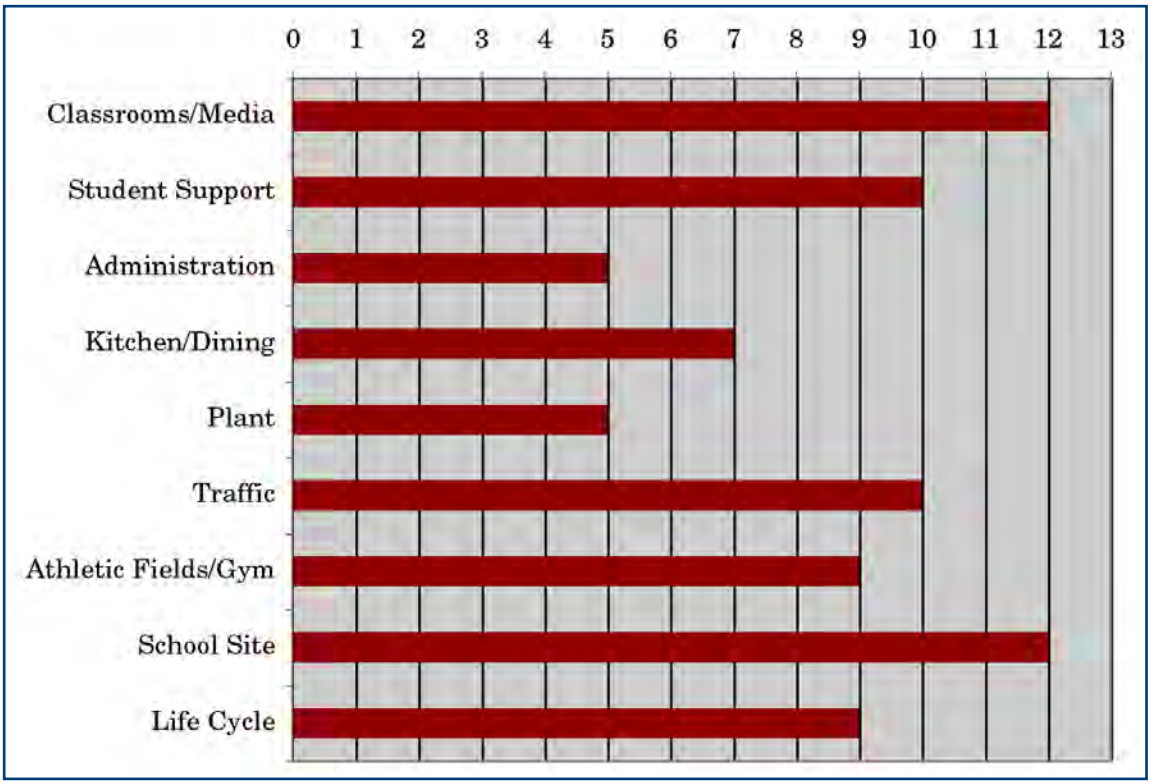
Wake County's school building renova tion plan does little to increase the capacity of the thirteen schools slated for major ren ovation (see Table 2). The renovation plan would increase square footage by 236,300 square feet and add 2,096 seats, equiva lent to the size of one high school. Three schools — Poe Elementary, Martin Middle, and Enloe High — would gain no seats in the proposed renovation plan. The cost for the thirteen school renovations would be $106,754 per seat gained and $1,035 per square foot gained.

Cost per seat is around four times the average cost of a new school seat, and the square foot cost is around nine times the cost of a new school. For new elementary schools bid in 2005, the Wake County Schools spent be tween $16,000 and $24,000 per seat and between $125 and $165 per square foot on construction. For new high schools bid in 2004, the school system spent between $19,900 and $20,700 per seat and between $117 and $123 per square foot on construc tion.[10]

Wake County's school building renovation plan does little to increase the capacity of the thirteen schools slated for major renovation.

Although nearly all the projects would

Figure 1. Proposed Renovations for 13 Wake County Schools (by Type)[13]



add some classroom space, the majority of the schools in the renovation plan would receive site work, including reworked traffic patterns, landscaping, and athletic upgrades (see Figure 1). Enloe High School, for example, would receive a makeover of its athletic fa cilities, including a new weight room, locker rooms, ten nis courts, basket ball courts, and a softball field. Over one-third of the schools would receive renovated or new administrative offices, and three-quarters of the schools would receive renovated sup port spaces.

Wake County Schools plan to use one fourth of the 2006 bond funds to renovate thirteen schools, but that would yield only enough seats to accom modate 1/15th of the new students.

In the eyes of the school system, the projects outlined in the renovation plan are necessary. The question is whether these kinds of projects are consistent with the need to accommodate student enrollment growth. If accommodating growth is the priority, then the $245 million renovation plan is inadequate and costly. To put this in perspective, the Wake County Schools plan to use one-fourth of the 2006 bond funds to renovate thirteen schools, but that would yield only enough seats to accommo date 1/15th of the new students gained over the four-year life of the bond.[14]

Reducing the Cost of Adding Seats

Under the $1.056 billion school facilities spending plan, the Wake County schools proposed building 17 new schools — 11 elementary, 4 middle, and 2 high schools. These schools would cost an estimated $561 million and would provide a maximum of 23,300 new seats.[15] Not including the cost of land, it would cost at least $20,606 for each elementary seat, $26,169 for each middle school seat, and $30,703 for each high school seat.

Table 3. Wake County School Facilities Alternatives, 1996 – 2006[18]
Note: Bond referendum years are shaded in blue (1999 referendum failed)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Adaptive reuse		1									3
Modular schools											3
Ninth grade centers									2		6
Joint use agreements					1		1		2	8	4
Reassignment	2,320	1,696	3,193	5,055	3,651	2,385	4,157	2,355	7,738	N/A	9,307

According to School Planning and Management's 2006 Construction Report, the median total cost for new schools in the four-state region was $17,417 for an elementary school seat, $22,094 for a middle school seat, and $23,917 for a high school seat.[16] To adjust for increases in school construction costs, a 12 percent increase in these costs still makes Wake County's school construction costs higher than the regional median costs for all three levels of schools.[17]

New and renovated schools combined would add around 25,400 seats at a cost of $805.8 million or $31,724 per additional seat. Without a doubt, the school system will need to renovate existing schools and build new schools to accommodate growth, but the Wake County Schools' spending plan does not do so in the most cost-effective way possible. What steps can be taken to maximize taxpayer investment in school facilities?

Between 1996 and 2003, the Wake County Schools employed few alternatives to accommodating enrollment growth (see Table 3). Clearly, stress on current school capacity is a product of many years of creating new seats only by building traditional schools, as had been the practice for decades. Even in the midst of the impressive enrollment growth throughout the 1990s, the school system's approach to creating seats did not fundamentally change.

Financing schools is another matter. The best way to finance debt is to issue bonds rather than certificates of participation (COPs). Bonds carry a lower interest rate than COPs, lowering the overall repayment of interest on the debt. The best way to pay for schools, however, is to use pay-as-you-go funding (see Table 4). This simply means paying for schools with cash on-hand, which avoids the payment of interest on bonds or COPs altogether. Every dollar used for interest payments is a dollar not going to pay for school facilities.

An initial estimate found that Wake County's debt service could force annual payments of $465 million by 2016.

An initial estimate showed that Wake County's debt service could force annual payments of $465 million by 2016 if the county borrowed as much as $5.6 billion for school construction.[28] If the county scaled back its new debt to only $3.8 billion, the annual payment on new debt for school construction alone would reach $190 million by 2016.[29] Currently, Wake County has approximately $1.3 billion in outstanding debt and a debt service payment of $129.8 million budgeted for FY 2007.[30] The new debt service payments on $3.8 billion in new bond debt would total $1.2 billion by 2020 and raise taxes by 13.6 cents per $100 valuation. The total tax impact on the $3.8 billion plan, which includes operating impacts, enrollment increases, and new programs, would increase taxes by 45.9 cents

Table 4. Pay-As-You-Go Fund: Initial Sources of Revenue

	FY 2007 Budget	FY 2008 (Estimated)	Through 2013 (Estimated)
Lottery revenue	$9.15 million	$9.15 million	$54.9 million[19]
Redirect a portion of the Hotel/Restaurant Tax revenue	$11 million	$12.3 million	$97.4 million[20]
Transfer In – Ad Valorem Tax	$0	$16 million	$96 million[21]
Redirect Community Capital Projects funds	$500,000	$500,000	$3 million[22]
Redirect Community Use/School Parks funds	$0	$1.3 million	$7.8 million
Redirect a portion of funds to be used for the future regional center	$0	$0	$3 million[23]
Education Capital Funds: Other Sources	$5.6 million	$5.9 million	$36 million[24]
WCPSS staff reduction	$0	$1 million	$6 million[25]
Redirect Exploris/IMAX funding	$1 million	$1 million	$6 million
Redirect Animal Care Control and Adoption Center funds	$502,890	$500,000	$3 million[26]
Redirect Fire Arms Education Center funds	$122,700	$120,000	$736,200[27]
Totals	***$27.9 million***	***$47.8 million***	***$313.8 million***

per $100 valuation.[31]

A pay-as-you-go fund could draw from several different revenue streams, small or large. Lottery revenue is the most widely known source of capital funding for schools. The Hotel/Restaurant Tax and Ad Valorem Tax are two fast-growing sources; the county could dedicate a portion of each for the pay-as-you-go fund. Redirecting funds that the county plans to use to pay for smaller projects and other expenditures may not produce much funding alone. But if the school enrollment growth is a crisis, then the county government and school system must take every opportunity to redirect revenue, however small, and dedicate those funds to school construction.

The system should redirect funds away from low-priority projects, reduce the bureaucracy, reduce costs, use existing revenue streams, and implement alternatives.

Of course, a large-scale school construction program will not be able to have enough cash on-hand to avoid paying for schools with some form of debt like bonds or COPs. This should not be used to justify raising special taxes or fees for a school construction bond or pay-as-you go fund. The school system should redirect funds away from low-priority projects, reduce the size of the county or school district bureaucracy, reduce costs, use existing revenue streams, and implement alternatives (see Table 5).

Charter Schools and Public/Private Partnerships

In order to increase the number of charter schools, the state legislature must remove the charter school cap, and the State Board of Education would have to approve proposed schools in Wake County. Making this reform is not a matter of consensus but a matter of willingness to demand legislative action. The consensus is that the charter school cap should be increased, if not removed. Fast-growing school systems, include Wake and Charlotte-Mecklenburg, could use their considerable influence to prompt the legislature to increase or remove the cap, but they have not done so.

Table 5. Wake County School Facilities Alternatives, 2008 – 2013

	2005-06 Schools	*2005-06 Seats*	*Proposed Schools and Sites*	*Estimated Seats Gained*	*Capital Cost*	*Savings*[32]
Charter Schools	14	4,988	7	2,500	$0[33]	$21,000,000
Public/Private Partner ships	0	0	5 ES	4,000[34]	$0	$118,086,420[35]
Pay-As-You-Go Fund	N/A	N/A	6 ES, 2 MS, 1 HS	8,425[36]	$313,800,000[37]	$47,483,904[38]
Adaptive Reuse	1[39]	981	2 ES, 1MS[40]	2,000	N/A[41]	N/A[42]
Year-Round Conver sion[43]	4 MS	4,655	3 MS	936[44]	$0	$7,862,400
Learn and Earn/Early College, satellite campuses, and virtual schools	0[45]	0	4 Learn and Earn sites; 4 sat ellite campuses	1,400	$0	$11,760,000
Full utilization of existing school capacity (ASCC)	N/A	N/A	N/A	3,938[46]	$0	$33,079,200[47]
Totals	***19***	***10,624***	***35***	***23,199***	***$313,800,000***	***$239,271,924***

Note: ES=Elementary School; MS=Middle School; HS=High School

The legislature recently approved the use of public/private partnerships for school facilities. This allows a developer to build a school and lease it back to the school system. Charlotte Mecklenburg Schools has been one of the first North Carolina school systems to commit to using public/private partnerships to build schools. Other school systems, including the Wake County Schools, have only committed to "looking into" public/private partnerships. School systems that require additional facilities should be proactive, committing to partnerships with private developers on a yearly basis.

In order to do so, school systems like the Wake County Schools that have strin gent assignment or busing policies would have to allow flexibility to public/private partnership schools.[48] Developers will want to build schools in order to increase the value of homes in a subdivision they build, so the school system must allow children in the subdivision to attend the school. Cur rent student assignment policies do not guarantee that a student will attend the school that is closest to his or her home. Until the school systems change this policy, there will be little incentive for developers to engage in a public/ private partnership with a school system.

Developers will want to build schools to increase the value of homes in their subdivisions, but the school system must allow children in the subdivi sion to attend the schools.

Adaptive Reuse

Adaptive reuse schools are business or manufacturing facilities that have been converted into a school. Wake County's Lufkin Road Middle School, which was converted from the American Sterilizer Co. Plant into a school in 1998, is a good example of adap tive reuse.

Nevertheless, adaptive reuse projects have been few and far between in recent years (see Table 3). Wake County Schools have plans for three additional adaptive

reuse projects in upcoming years. Given the rising cost of land and construction, adaptive reuse projects should have been a staple of the building program over the last ten years.[49]

Year-Round Schools and Attendance Zones

Families have welcomed year-round schools for years, but many have not welcomed mandatory assignment to these schools. The conversion of three existing middle schools recommended in Table 5 would allow Wake County Schools to implement a controlled choice plan for both elementary and middle schools. Under this plan, the school system would give parents, within an attendance zone, a choice between year-round elementary and middle schools.

The wealth of business and industry in Wake County would permit the school system to create several satellite campuses.

The choice plan would work like this: Parents who declare a choice for a traditional or year-round school would have their children assigned to the desired school, so long as space is available. If applications exceed spaces, a lottery system would determine who will be assigned to the school. Parents who declare no preference would have children assigned to the school that is closest to their home. Parents who do not get the school of their choice will have the option of reapplying the following year.

Learn and Earn/Early College

The Learn and Earn/Early College Program is a public/private partnership that creates small high schools on the campuses of local colleges and universities. Funded jointly by the state and the Bill and Melinda Gates Foundation, students who complete this five-year program may obtain a high school diploma and an associate's degree (or transferable credits).

Unfortunately, there has been little evidence that Learn and Earn schools are raising student achievement, and the first statewide assessment of the program is a year or more from completion. With this in mind, expansion of the Learn and Earn program should proceed only from evidence that the program increases student performance.

Satellite Campuses

Littleton High School in Littleton, New Hampshire, wanted to expand its vocational and business programs but could not afford to construct a new building for these programs. Littleton's solution was to find vacant spaces in the community for satellite campuses. The school district rented an empty furniture store, shared space with a local business, and converted extra space at a bank for their technology program.

One advantage of using satellite campuses was that vocational and business teachers were able to combine classroom instruction with an on-site demonstration of its practical application. The success of these satellite campuses led Littleton school officials to consider converting part of a town hall into classroom space.[50]

The wealth of business and industry in Wake County would permit the school system to create several satellite campuses in growing parts of the county. Companies like SAS and the Lord Corporation, for example, would be excellent locations for satellite campuses.

Virtual Schools

A virtual school is an Internet-based learning environment that allows students to participate in a class using a computer rather than being present in a school classroom. Contrary to popular perceptions, virtual schools are rigorous academic

Table 6. Examples of Architectural Efficiency in Prototype Designs[53]

Prototype School	*Efficiency of School Design*	*Efficiency of School Building*
Jeffreys Grove Elementary	69.8%	67.5%
Wakefield Middle School	62.8%	63.5%
Green Hope High School	66.9%	63.6%
Knightdale High School	57.8%	64.1%

institutions that often exceed state curricu lum standards. Students can access all class materials, including lectures, notes, assign ments, and handouts, through the Internet. Students can also access audio and video content not available to those in traditional classrooms. Certified teachers offer one-on-one communication with the student, and they often recruit experts in the subject area to interact with virtual-school students through interactive lectures and online chats.

School districts across the country have successfully used virtual schools for years, but North Carolina has fallen behind states such as Florida and Kentucky in develop ing statewide virtual-school initiatives. In response, the North Carolina Department of Public Instruction plans to create and implement a statewide virtual high school.[51] It is difficult to estimate how many stu dents would choose to enroll in the vir tual school, but judging from the success enjoyed by other states, North Carolina can expect an enthusiastic response from students in Wake County and beyond.

Efficient School Designs

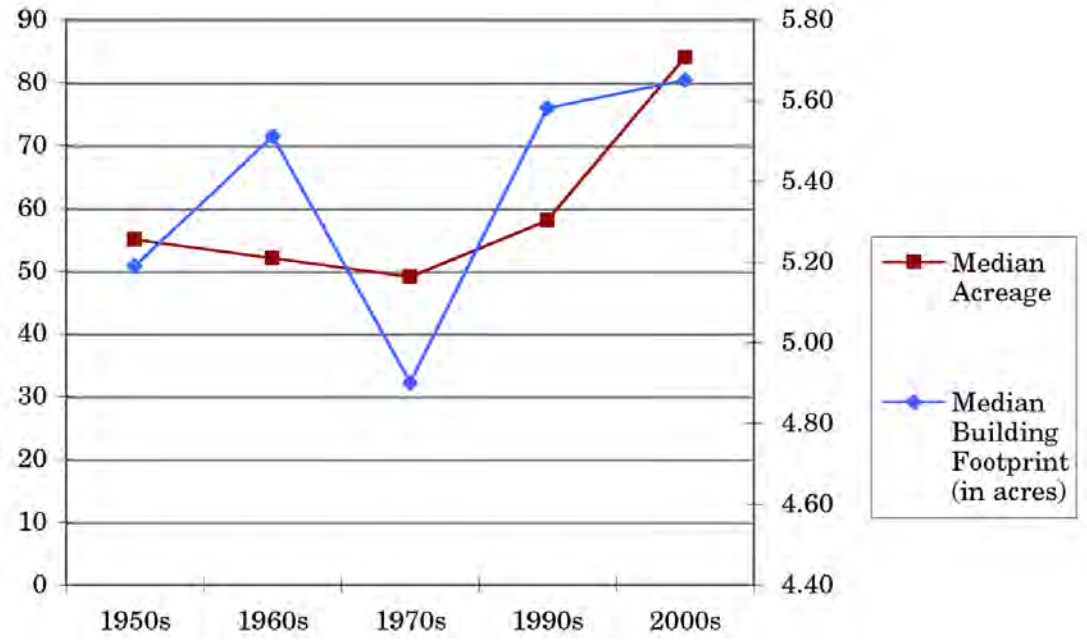
School buildings should maximize assigned or program space. For example, a review of the Houston Independent School Dis trict recommended constructing school buildings that assign between 70 and 75 percent of the total building space for programmatic activities.[52] Schools require some non assignable space in the form of hallways, stairways, bathrooms, elevators, and mechanical rooms, so it is difficult to assign more than 75 percent for program matic activities. On the other hand, school designs should limit non-assignable spaces like foyers, storage closets, and the like. Non assignable spaces increase the cost of construction, and they often increase maintenance costs. Most importantly, they contribute little to a school's educa tional mission.

School districts across the country have successfully used virtual schools for years, but North Carolina has fallen behind.

To optimize school building efficiency, the Wake County Public School System should require archi tects to design schools with an architec tural efficiency percentage (program square footage/gross square footage) in the 70 to 75 percent range. For example, the school system often reuses the same designs (pro totypes) for school buildings as a cost-sav ing measure, but these designs vary in how efficiently they dedicate square footage for educational purposes (see Table 6). The Jef freys Grove Elementary School prototype is an efficient design and the school system should replicate it. The Wakefield Middle School, Green Hope High School, and Knightdale High School designs are less efficient and should be modified or substi tuted for another design.

For every 1,000 square feet of non-assignable space that is eliminated, an elementary school building can hold an additional classroom. A savings of 750 to 850 square feet can provide space for an

Figure 2. Comparison of Median High School Site and Building Footprint in Wake County (in Acres)[54]



Note: The school site acreage is on value axis (left) and the building acreage is on the secondary value axis (right). The median building footprint is the building square footage (all floors) converted to acres. No high schools were built in the 1980s.

additional middle or high school classroom. For example, a 5 percent increase in assign able space for a 250,000-square-foot high school can produce around 16 additional 750-square-foot classrooms, not including hallways.

For every 1,000 square feet of non-assignable space that is eliminated, an elementary school building can hold an ad ditional classroom.

Wireless Technology

Computers are essential learning tools, and com puter literacy is an important part of a school's educational mission. Accordingly, computer labs and large media centers have become staples of every public school building. Wireless technology, however, will provide students the benefits of computer use without the need to outfit and occupy classroom space.

For public school districts, wireless net working is a financially viable alternative to the expensive process of wiring and rewir ing schools, especially those that were not designed to carry computer wires. Class rooms, libraries, and media centers can be reduced in size because computer stations would no longer need to be incorporated into the design of the space. Computer labs would be unnecessary. From an instruc tional point of view, teachers would be free to use computers for classroom instruction whenever their own lesson plans required it, rather than competing with their col leagues to coordinate a day and time to use the computer lab.

The quality of wireless technology will continue to improve and the cost will continue to fall. More and more for-profit, non-profit, and governmental organizations have chosen to use wireless networks, and even families are able to purchase reliable wireless networks for their homes at mini

mal cost. Because the price and quality of laptop computers are now comparable to desktop computers, there is little need for bulky, wired computer stations.

Unfortunately, school systems that plan to replace old, outdated computers fail to recognize the potential of wireless technol ogy to save money on capital costs and/or provide additional seats for students.

Rethinking School Sites

As the price of property continues to increase in North Carolina's urban areas, school systems must build more school on less land. Historically, many school systems, including the Wake County Schools, did not consistently align building square foot age with acreage (see Figure 2).

For example, high schools built in Wake County in the 1960s and 1990s were larger schools occupying smaller tracts of land. This is the ideal. High schools built there in the 1970s were smaller schools occupy ing larger tracts of land. This is undesir able. In the 1950s and from 2000–2005, the Wake County schools built high schools on comparable tracts of land. The school system should return to the construction and land use practices of the 1990s, striving to build larger schools on smaller sites. As a guideline, the school system should build high schools with a footprint of 5.6 acres and above on less than 60 acres of land. Be sides simply building schools on less land, add additional floors to schools as a way to maximize the building footprint on a site.

Two possible objections to this policy concern more demanding zoning and envi ronmental regulations and a less selective property market. Every additional zoning requirement adds to the cost of the schools because meeting them often consumes time and resources. For example, regulatory requirements for school property, including regulations regarding drainage, collection, and treatment, have increased over the years. Yet there is no evidence that these and other requirements provide substantial benefits to the school building, school site, or surrounding property. Among builders and architects, there has been little effort to lobby for zoning requirements that of fer greater flexibility for schools. Builders, architects, and school officials should nego tiate with city, county, and state officials to ease zoning require ments for schools.

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Property may be difficult and expen sive to acquire in urban counties, including Wake County, than in past years. That does not mean that school systems do not have flexibility in the use of their property. Surplus property adjacent to the school site could be sold to private parties for residential or com mercial development. Even small tracts of land would be appealing to an entrepreneur who, for example, wishes to build a day care center or children's gym on land adjacent to a school site. Most importantly, every acre that the school system returns to private developers is an acre that returns tax rev enue to city and county coffers.

Recommendations

As stated earlier, if the Wake County Schools is facing a crisis about how to accommodate growth, then increasing the number of seats must be the school sys tem's first priority. Wake County Schools' proposed $1.056 billion spending plan (including the $970 million bond and $86 million in pay-as-you-go funds) does not add seats in a responsive, cost-efficient, and timely way.

Ways to improve the billion-dollar spending plan include:

1. Use renovation projects as oppor tunities to simultaneously add seats and address health and safety concerns.

2. Commit to use every school con struction alternative available, including
   - Charter schools
   - — Adaptive reuse
   - — Modular schools
   - — Ninth grade centers
   - Joint use agreements
   - Public private partnerships
   - — Year-round schools of choice
   - — Learn and Earn/Early College sites
   - Satellite campuses
   - Virtual schools

3. Create a pay-as-you go fund that will decrease the interest paid on debt like bonds or certificates of participation and increase funds available for school facilities.

4. Use efficient school designs that assign between 70 and 75 percent of the total building space for educational and programmatic activities.

5. Integrate wireless technology into school designs.

6. Build larger schools on less land, and find alternate uses for surplus land.

7. Work to establish more flexible zoning and environmental regulations for schools.

This policy report was designed to be a blueprint for reform. Many of those who defend the Wake County Schools spending plan and the bond have a right to demand that detractors temper their criticism with practical solutions to ac commodating school enrollment growth. While not all the solutions offered in this policy report are immediately actionable, they do point the way to a comprehen sive strategy that is friendly to taxpay ers and school officials alike. Put simply, the correct mix of bonds, pay-as-you-go funds, facilities alternatives, and efficient building practices would allow the Wake County Schools to successfully meet the challenges of growth for years to come. Otherwise, the school system has created a blueprint for failure.[55]

Notes

1. Craig Wilson, "Meditate on this: Your house is not an 'om'," *USA Today*, June 29, 2004, www.usatoday.com/life/columnist/finalword/2004-06-29-final-word_x.htm.

2. 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," Spring, 2006, p. 1, www.wcpss.net/growth.

3. See Terry Stoops, "Wake County's Edifice Complex: Extravagant School Buildings Do Not Lead to Higher Student Achievement," John Locke Foundation, *Spotlight* No. 295, www.johnlocke.org/spotlights/display_story.html?id=142.

4. Lawrence O. Picus, Scott F. Marion, Naomi Calvo, and William J. Glenn, "Understanding the Relationship Between Student Achievement and the Quality of Educational Facilities: Evidence From Wyoming," *Peabody Journal Of Education*, 80(3), 2005, 71-95. The authors point out that, "Very little empirical evidence supports this common belief that high-quality school facilities are a positive factor in student achievement. ... Conventional wisdom

suggests that a school's physical environment has an impact on student learning, but researchers have had difficulty demonstrating statistically significant relationships between the physical environment and student outcomes" (pp. 72-73).

5. Steve Higgins, Elaine Hall, Kate Wall, Pam Woolner, and Caroline McCaughey, "The Impact of School Environments: A Literature Review," The Design Council, February 2005.

6. According to the Department of Public Instruction, Average Daily Membership (ADM) is the "total number of school days within a given term–usually a school month or school year — that a student's name is on the current roll of a class, regardless of his/her being present or absent, is the "number of days in membership" for that student. The sum of the "number of days in membership" for all students divided by the number of school days in the term yields ADM. The final average daily membership is the total days in membership for all students over the school year divided by the number of days school was in session. Average daily membership is a more accurate count of the number of students in school than enrollment." Department of Public Instruction, "North Carolina Statistical Profile 2006," p. 1. All ADM figures provided, with the exception of 2005, are final ADM numbers.

7. All data, except for ADM numbers, were obtained from the North Carolina State Data Center, LINC, linc.state.nc.us.

8. The 2005 ADM is the first month numbers, which are usually higher than the final ADM. For this reason, the ADM percent increase between 2004 and 2005 may be inflated.

9. Wake County Public School System, "Building Program Cost Breakdown," www.wcpss.net/bond.

10. *Ibid.* Wake County Board of Education and The Board of County Commissioners, "Capital Program Planning Issues: Addendum," May 2006. Data for recently completed projects provided by Alex Fuller, Supervisor of Program Controls, Facilities Planning and Construction, Wake County Schools. The projects include Brier Creek ($21,047), Sanford Creek ($24,131), Forest Pines Drive Elementary ($23,829), Holly Springs High ($19,948), and Panther Creek High ($20,729).

11. Mike Burriss, "CIP 2006: Existing Campus Major Project," Wake County Public School System, September, 2006.

12. *Op. cit.* at note 9.

13. Wake County Public School System, "Blueprint for Excellence 2006: Major Renovations," www.wcpss.net/bond/major_renovations.html.

14. The school system is projected to add 32,693 students between 2006-2007 and 2010-2011. See Wake County Public School System, "Actual and Projected WCPSS Enrollment From 1985 to 2025," November, 2005, www.wcpss.net/demographics/overview/index.html.

15. The actual capacity of these schools will vary according to the final building design, the addition of mobile units, and schedule. The assumption used here is that all elementary and middle schools will be converted to year-round schools, yielding 1,124 elementary and 1,623 middle school seats per school. It also assumes that each high school will have 2,223 seats. For both middle and high schools, it is assumed that the school system will use the "large" building design.

16. Paul Abramson, "11th Annual Construction Report," *School Planning & Management*, February, 2006, p. C-12. The four state region includes North Carolina, South Carolina, Kentucky, and Tennessee.

17. *Ibid.* This assumes that construction costs will rise at a pre-Katrina rate of three percent a year for four years. It also follows the *School Planning & Management* report's prediction that U.S. school construction will slow in upcoming years, increasing supply and lowering demand (and cost) of essential school construction materials. The adjusted cost is $19,507 ($20,606) for an elementary school seat, $24,745 ($26,169) for a middle school seat, and $26,787 ($30,703) for a high school seat (Wake County averages).

18. See Wake County Public School System, "Blueprint for Excellence 2006: Frequently Asked Questions," www.wcpss.net/bond/faqs.html; WCPSS, "Looking Beyond the Typical Solutions to Provide Classroom Seats," April 2006, www.wcpss.net/auxiliary-services/faqs.html; Wake County Board of Education, "Board Minutes," 2000-2006, www.wcpss.net/Board/minutes/index.html.

19. Future lottery revenue will depend on changes in enrollment, the effective tax rate, and total lottery revenue received.

20. This total assumes fixed costs for administrative costs ($800,000), the convention center debt ($10.4 million), and RBC Center debt ($5.2 million). It also assumes that the tax revenue will grow by an average of 5 percent per year between 2008 and 2013. It also assumes that legislation will be enacted that would allow the county to redirect funding from the Centennial Authority ($1.6 million a

year), the Greater Raleigh Convention and Visitor's Bureau ($3.3 million a year), the city of Raleigh ($1.7 million), and the town of Cary ($601,600). It also assumes that the county would redirect discretionary funds ($1 million) and funds reserved for future projects ($1.8 million). Finally, it assumes that Five County Stadium could be sold to a private party, disposing of the $991,000 yearly debt service payment. The total revenue projected here does not take into account the additional tax revenue generated by returning this facility to the tax rolls.

21. The actual total amount transferred for education capital projects (though 2013) is $406 million. These funds would be used to pay the debt service on nearly $2.5 billion in debt authorized or planned to be authorized by the county. By reducing the amount of debt, a portion of the ad valorem tax, which Wake County uses to pay for capital projects, could be transferred into a permanent pay-as-you-go fund. The total assumes a yearly transfer of $16 million a year into the pay-as-you-go fund, but the actual amount would be at the discretion of the county commissioners.

22. Currently, these funds are reserved for future projects.

23. A Regional Center is scheduled to be opened by 2011. The facility will be based on a prototype plan used for the Northern Regional Center, which includes a branch library, EMS station, town park, greenway trail connection and post office. Plans for the future regional center should scaled back or a facility should be leased in the desired part of the county. Another option is to add the necessary square footage to an existing county-owned facility, such as a library or school.

24. Wake County does not specify these sources and does not project revenue from other sources beyond 2008. The total assumes a constant revenue stream of approximately $6 million a year.

25. County-funded administrative positions only.

26. This is a county-owned facility. This facility should be sold and the services required by the county should be outsourced to a non-profit organization. The facility has had an average loss of $240,000 a year over the last five years. The county projects a $218,000 loss for 2007. The total revenue projected here does not take into account the additional tax revenue generated by returning this facility to the tax rolls.

27. This is a county-owned facility. This facility should be sold and services required by the county should be outsourced to a private facility. The facility has had an average loss of $76,000 a year over the last five years. The county projects an $82,000 loss for 2007. The total revenue projected here does not take into account the additional tax revenue generated by returning this facility to the tax rolls.

28. Michael Wagner, "Bonds Could Bury Wake Under Mountain of Debt," *Triangle Business Journal*, February 17, 2006, triangle.bizjournals.com/triangle/stories/2006/02/20/story1.html.

29. Wake County Budget and Management Services, "February 2006 Scenarios," February 15, 2006. The scenario assumes passing three bonds in the next six years.

30. Wake County Budget and Management Services, "Fiscal Year 2007 Adopted Budget," www.wakegov.com/about/budget/fy07/budget.htm. See also Rick Martinez, "Schools' Load Can Be Eased," *The News and Observer*, February 1, 2006, www.newsobserver.com/1108/story/394802.html.

31. *Op. cit*. at note 29.

32. In most cases, the savings column represents the number of schools that the school system would need to build to create the seats otherwise gained by the alternative. Because the students who participate would likely come from disparate areas of the county, it is impossible to supplant plans for specific school sites. A charter or Learn and Earn school, for example, will draw students from various parts of Wake County. For these programs, the savings is calculated using the 2004-2005 per-student capital outlay (5-year average, $1,400/year) over six years. In addition, year-round middle schools and full utilization of existing seats is calculated in this way because the number of student seats gained for each school is small. This figure, however, may underestimate the savings, especially if enrollment patterns in particular charter or Learn and Earn schools draw a number of students from similar areas of the county. This does not apply to public/private partnerships, schools built using the pay-as-you-go fund, and adaptive reuse. Students in adjoining nodes are assigned to these schools.

33. Charter schools do not receive funds for capital expenditures.

34. Based on the Wake County Schools' estimated capacity for a large elementary school (800) on a traditional schedule.

35. According to the 2007-2009 Capital Improvement Plan (CIP), the average cost of an elementary school is $23,617,284, middle school is

$44,403,232, and high school is $68,251,650. The actual cost of a new school will vary.

36. Based on the Wake County Schools' estimated capacity for a large elementary school (800), standard middle school (981), and standard high school (1,663) all on a traditional schedule.

37. The total cost of the nine schools listed is $298,761,818. The remaining funds could be used to pay for land and site development.

38. At a fixed interest rate of 4.25%, a 20-year bond would require annual payments of $23,603,984. Total savings over the life of the bond would be $158,279,680, which represents the total interest that would need to be repaid on a bond of $313.8 million. The actual savings will depend on the terms of the bond sale, including the interest rate and the dollar amount sold.

39. Lufkin Road Middle School. The ninth grade center in the former Winn-Dixie, the proposed school in the former Bespak facility, and the River Oaks Middle School in the Hedingham Office Complex are not included because they were not in operation in 2005-2006.

40. This is a recommendation based on the stated needs of the school system. The grade level will be determined by the size and location of the facility.

41. The cost of adapting a vacant facility will depend on the scope of the project.

42. Adaptive reuse projects usually yield some cost savings, but time savings is the greatest advantage. It takes less time to adapt an existing facility into a school than to build a new school.

43. Parents should have the option to enroll their children in these schools.

44. The 2007-2009 CIP estimates a 312-seat gain for each middle school converted to a year-round schedule. The operating impact of conversion is estimated to be approximately $200,000 per middle school.

45. The Wake Early College of Health and Sciences (located at the Wake Technical Community College's Health Sciences Campus) is new for the 2006-2007 school year. This count does not include the East Wake High School of Health Science or the East Wake School of Integrated Technology, because neither is located in an off-campus facility.

46. As of 2005-2006, this is the number of seats available at WCPSS schools. It subtracts 2005-2006 enrollment for each school from the school's Annual School Campus Capacity (ASCC). The ASCC is the building capacity plus on-site mobile unit capacity with supplemental program adjustment.

47. In 2005-2006, there were 1,350 elementary school seats, 1,285 middle school seats, and 1,303 high school seats not utilized.

48. Ronald D. Utt, "New Tax Law Boosts School Construction with Public-Private Partnerships," Heritage Foundation *Backgrounder* No. 1463, August 8, 2001, pp. 1-9. See also Utt, "Public/Private Partnerships Offer Innovative Opportunities for School Facilities," The Maryland Public Policy Institute, 2005, and Mark Howard, "Law Gives Charter Schools Access to Tax-Exempt Bonds," School Reform News, April 2002, p. 18.

49. Stephen Spector, "Creating Schools and Strengthening Communities through Adaptive Reuse," *National Clearinghouse for Educational Facilities*, August 2003, pp. 1-12.

50. *Ibid.*

51. "State E-Learning Commission Formed to Develop Virtual High School and Other Learning Opportunities," DPI Press Release, April 12, 2005. "State Board of Education Highlights," June 29-30, 2005.

52. Texas Performance Review, "Children First: A Report on the Houston Independent School District," October 1996. According to the report, "Efficiently designed school facilities will have 70 to 75 percent assignable space and 25 to 30 percent nonassignable space. Anything more than 30 percent nonassignable space is considered unnecessary because it cannot usually be made assignable through remodeling."

53. Department of Public Instruction, School Planning Division, "Prototype School Design Clearinghouse," www.schoolclearinghouse.org; Wake County Public School System, "School Data from CAFI," May 15, 2006.

54. WCPSS, "School Data from CAFI."

55. Special thanks to Alyn Berry, Joseph Coletti, and Michael Moore for their assistance on this project.

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"To prejudge other men's notions before we have looked into them is not to show their darkness but to put out our own eyes."

JOHN LOCKE (1632–1704)

Author, *Two Treatises of Government* and *Fundamental Constitutions of Carolina*

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