

Testing the Connection: Student Achievement, Student Behavior, and New Construction

Is there a link between new construction and student achievement? What role does socioeconomics play in the answer?

By Edward P. Cox, Ed.D., and Lynn Patrick Landis, Ph.D.

Nathan DeRolph attended high school in a predominately rural Ohio school district that lacked adequate supplies, including enough chairs for students in every class. His science class was equipped with three microscopes, only one of which worked. The building was in disrepair and in dire need of renovation and new equipment. Evidence suggested that this poor rural school was unable to compete academically, in part because of inferior facilities and equipment.

In 1997, DeRolph's parents filed a suit on his behalf challenging the Ohio Constitution on the grounds that the state failed to provide an equitable education for all students. The Ohio Supreme Court ruled on five separate occasions that the system of school finance in Ohio was unconstitutional.

tional and failed to meet the "thorough and efficient" standard prescribed by the state constitution (Edlefsen and Barrow 2001). Yet the system remains in place.

To address this issue, the state created a \$23 billion school construction and renovation program and established the Ohio School Facilities Commission (OSFC) to distribute the financial aid to school districts with deteriorating school buildings (McKinley 2005a, 2005b). The major premise for creating the OSFC was that students attending schools in impoverished areas were receiving an inequitable education as a result of deteriorating and poorly maintained schools. The OSFC was created as a means to improve the academic progress of students in those impoverished school districts.

The \$23 billion expenditure for the construction of new school facilities and remodeling of others represents a large financial commitment to improving education in the state. More than 700 schools have been constructed in Ohio since 1999 under OSFC programs, with expenditures now totaling approximately \$8 billion.

What is the effect of those expenditures? Is there a link between new construction and student achievement?

To try to answer those questions, we conducted a six-year study of Ohio school districts in areas of low property wealth.

Study Design

Ohio funds 612 public school districts with at least one high school. The lowest quartile of property wealth includes 153 school districts, and they provided the data for the study. Data were collected for seven academic indicators and two behavioral indicators.



Table 1. Academic Indicators

Indicator	OSFC Schools (Sample Group)			Non-OSFC Schools (Control Group)		
	2005	2011	Difference	2005	2011	Difference
OGT reading	90.8	88.3	-2.5	90.5	87.8	-2.7
OGT writing	83.4	90.7	+7.3*	80.9	90.2	+9.3*
OGT mathematics	81.0	84.0	3.0*	79.4	83.8	+4.4*
OGT social studies	78.4	81.8	+4.4*	76.0	79.1	+3.1*
OGT science	71.1	76.0	+4.9*	70.7	77.5	+6.8*
Performance index	95.3	98.8	+3.5*	93.6	98.1	+4.5*
Graduation rate	90.8	93.1	+2.3*	93.5	94.6	+1.1

Note: OGT = Ohio Graduation Tests.

*Statistically significance.

The high schools ranked in the lowest wealth quartile were then divided into two groups: schools with new facilities built under the OSFC and schools without new facilities. Thirty-three school districts in the lowest quartile of the property wealth ranking were in the process of constructing new schools at the time of the study. Those 33 school districts were excluded because post-construction data were unavailable.

The OSFC recalculates and issues the School Facilities Eligibility Ranking List annually. To account for the possibility that some school districts might be ranked within the lowest quartile for one fiscal year but not another during this six-year study, the FY05 ranking report was compared with the FY11 ranking report. Nine school districts appeared on one list but not the other and were excluded.

The study focused primarily on the concern raised in *DeRolph v. Ohio*: that schools in areas of low property wealth are inherently inferior because of Ohio school-funding formulas. The study addressed two important questions:

- Were there significant improvements in academic and behavioral indicators in new or remodeled high schools funded by the Ohio School Facilities Commission?
- Were those improvements evident or substantially different in schools not funded by the OSFC?

Data were collected for the same indexes from 2005 and 2011 for each group and analyzed for significant differences. The differences between the two groups were then compared.

Study Results

The study's findings negate the premise that newly constructed or remodeled high school facilities have a positive relationship with academic achievement. The OSFC

schools recorded positive significant changes on six of seven academic achievement indicators (Table 1). School districts in the control group (no funding) recorded positive significant changes on five of seven academic achievement indicators. Graduation rate was the one indicator that showed significant improvement for the OSFC schools but not the control group. Findings regarding behavioral indicators are provided in Table 2.

The student achievement data and the student behavior data were accessed through the Ohio Department of Education Electronic Data Warehouse.

Discussion

DeRolph v. Ohio was based on the idea that a lack of adequate funding created inadequate learning materials and facilities, which created an inferior system of education for some students. Judicial interpretation ruled that unequal facilities existed in areas of low economic wealth, inherently providing those students with unequal educational opportunities.

We suggest that school district ranking be based more on the combined factors of economic need and actual facility level.

This study did not substantiate the inherent premise that inadequate school facilities necessarily create inadequate educational opportunities for students. Students in the control group of school districts that did not build or remodel high schools achieved academic and behavioral results that were similar to those of the sample group.

Literature written when the OSFC funding initiative was developed indicates that school facilities and

Table 2. Behavioral Indicators

Indicator	OSFC Schools (Sample Group)			Non-OSFC Schools (Control Group)		
	2005	2011	Difference	2005	2011	Difference
Student attendance	93.0	93.9	+0.9*	94.1	94.0	-0.1
Student discipline	12.7	12.9	+0.2	11.7	11.5	-0.2

*Statistically significance.

mechanical systems are related to academic achievement. Earthman and Lemasters (1998) conclude that cosmetic conditions of school facilities have a positive correlation with student achievement. Earthman and Lemasters (1996, 1998, 2009) and Branham (2004) suggest that school facilities have a positive correlation with student behaviors. Taking the notion further, Schneider (2003) concludes that high teacher attrition is directly related to the conditions of the school facilities.

Student achievement as it relates to school facilities has even been narrowed to the study of specific aspects of the facility. Lackney (1997) and others indicate that students taught in full-spectrum lighting are more likely to be engaged in instruction. Similar literature describes the effects of lighting on academic achievement. Inefficient and outdated heating, ventilation, and air-conditioning systems are believed to contribute negatively to academic achievement (Erickson 2009; Lyons 2001).

In this study, aging school facilities, mechanical systems, or the cosmetic appearance of school facilities did not appear to have a strong relationship with academic or behavioral measures.

Further study on the topic of the relationship between academic achievement and school facilities is probably warranted.

Lessons for State and Local Leaders

The expenditure of \$8 billion in the state of Ohio was a large investment toward improved school facilities. OSFC funding was offered to school districts based on their ranking in property wealth relative to every other district in the state. The poorest school districts were given carte blanche to build new school facilities with a minimum local investment. School districts at the top of the list were required to fund only 1% of the total building cost locally regardless of the conditions of the existing schools.

We suggest that school district ranking be based more on the combined factors of economic need and actual facility level. Under the Ohio arrangement, school districts could replace existing schools even when it may not always have been necessary. The opportunity to have new school facilities for little local investment may have been an opportunity too lucrative for the least

wealthy school districts to pass up. Future programs should consider actual facility needs rather than a one-size-fits-all solution.

In addition, this research can guide educators in planning by creating a broader understanding of the relationship between school facilities and student achievement and behavior. Educators at all levels are often included as stakeholders in proposals to reform education. Assumptions made before the creation of the OSFC appear to have been based more on emotion, ideology, and legal concerns than on data regarding student performance.

Given these results, superintendents and business managers should be particularly cautious regarding the use of academic achievement and student behavior as a basis for constructing new school facilities. Recommendations for facility replacement, improvements, and repairs should focus more on funding mechanisms and less on claims of increasing student performance.

Recommendations for facility replacement, improvements, and repairs should focus more on funding mechanisms.

Local school leaders play an important role in developing proposals for educational facilities. Informed constituents need meaningful data when asked to approve monies for capital improvements. Avoiding false claims improves district leaders' long-term credibility.

The results should not be misinterpreted as being all-encompassing, broadly applied to every situation regarding academic achievement and student behaviors as they relate to school facilities. Findings are limited but should serve as a building block for guiding the thinking of state and local policy makers regarding the financing of facilities.

The OSFC was created at a time when measurable data were not as available or accessible to the public as they are now. Many school districts are facing genuine facility needs that cannot be dismissed, but caution is suggested when using improved student achievement and behavior as a "carrot" to secure approval for building projects. We hope building and financing issues can be

examined from a variety of perspectives before a commitment of funds is made on behalf of the taxpayers.

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Edward P. Cox, Ed.D., is associate professor of educational leadership and policies at the University of South Carolina. Email: coxep@mailbox.sc.edu

Lynn Patrick Landis, Ph.D., is superintendent of Bloom-Carroll Local School District, Carroll, Ohio. Email: llandis@bloomcarroll.net

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