UNITED STATES DEPARTMENT OF EDUCATION

Office of the Deputy Secretary
400 Maryland Avenue, SW
Washington, DC 20202

Telephone Number: (202) 260-1728 Fax Number: (202) 401-9027

FAX COVER SHEET

TO: Andy Rotherham

ORGANIZATION: DPC

PHONE:

FAX: 456-5581

FROM: H.G. Ramirez

COMMENTS:

Andy,

Attached is the cover & revised intro to the turning around low performing schools guide.

If there are any problems or changes, please feel free to page me or follow-up w/ Gordon (205-9895)

TOTAL PAGES (Including Cover): 14

LOW-PERFORMING

Turning Around Low-Performing Schools

A Guide for State and Local Leaders

I won't mislead you about the challenge we face: it takes hard work and a sustained commitment to turn around failing schools. The temptation is to look for a short-cut, a faster way to claim victory in the struggle to make every public school a good school. The real answer to the problem of failing public schools is not to abandon them, but to pursue a proven reform agenda, provide the resources necessary to fix those schools, and help provide a good education to all students.

-Secretary Riley, September 1999

I want to emphasize something that I think is very important. I believe that it is not enough to say, no social promotion, strict accountability, and even summer school and after-school programs for kids, unless there is a strategy to turn around low-performing schools. There is a lot of evidence that low-performing schools can be turned around.

-President Clinton, September 1999

November 1999

November 1999

Dear Colleague:

Last year, in response to a directive from President Clinton, the U.S. Department of Education released *Turning Around Low-Performing Schools: A Guide for State and Local Leaders*. The publication spoke to leaders and educators committed to ensuring that *all* students achieve to high standards and highlighted efforts across the nation to help schools focus on high standards of teaching and learning and implement strategies to raise student achievement.

I am encouraged by the fact that everywhere I go, governors, mayors, superintendents, principals, teachers, and parents are focused on the same basic strategies for improving our schools by emphasizing: high standards for all students, mastering the basics in the early years, smaller class sizes, encouraging parental involvement, improving teacher quality, expanding after-school and summer learning opportunities, increasing accountability for student performance, and modernizing our schools.

The strategies are beginning to pay off. The latest results from the National Assessment of Educational Progress (NAEP) report gains in math and reading achievement, including progress for low-achieving students and for students in our highest-poverty schools. For example, the 1998 NAEP reading assessment showed substantial gains for low-achieving students, suggesting that it was improvement among these students that raised the national average of all fourth graders. Similarly, high-poverty schools have registered the largest gains in NAEP math scores since 1992. Results from the States show similar positive trends. The National Education Goals Panel reports that between 1990 and 1996, 27 States significantly increased the percentage of 8th graders scoring at either the proficient or the advanced level on the NAEP math test.

Yet, despite these improvements in achievement, we know that there are still too many schools that are failing to provide a high quality education to our children. In some schools, expectations of students are low, teachers and parents are frustrated, and academic performance is poor. Many problems -- poverty, limited resources, family stress, poor teacher training, unsafe learning environments, and other factors -- contribute to frustration on the part of teachers, disillusionment on the part of communities, and discouragingly low levels of student achievement in such schools.

These problems are serious and highlight the complexity of the challenges facing schools. But they cannot thwart our efforts to improve our schools. Fortunately, we know a great deal and continue to learn more about how to fix persistently low-performing schools. Raising standards, better teachers, smaller class sizes, increased accountability, and greater parental involvement can turn around the worst of schools. A key part of improving failing schools is making sure that every student gets the extra help he or she needs to get back on track academically.

I am re-releasing this updated guide in 1999 in order to share with you some of the promising trends and examples of states and districts that are intervening in and improving persistently low-performing schools. This guide also highlights how the U.S. Department of Education is supporting efforts to help turn around low-performing schools with programs -- such as the Comprehensive School Reform Demonstration, Reading Excellence Act, Class Size Reduction and Teacher Quality Initiative, GEAR UP, and 21st Century Community Learning Centers – designed to improve teaching and learning, particularly in our nation's most disadvantaged schools.

The answer to the problem of failing schools is not to abandon them, but to pursue a proven reform agenda, provide the resources necessary for improvement, and help provide a world class education to all students. From California to New York, and Chicago to Boston, public leaders are raising their expectations for students and schools, supporting system-wide reforms that work, and demanding school and student accountability for performance. Across the nation, there are examples of schools that, with a bold set of strategies, are changing what happens between teachers and students in the classroom, focusing on learning, and improving student achievement.

While the task of fixing failing schools is not easy, the alternative is unacceptable. As we enter a new millennium, it is time to renew our commitment to future generations — to raise our expectations for all children, to refuse to accept failure, and to work together to strengthen our schools so that *every* child can strive toward high levels of achievement and learning.

Yours sincerely,

Richard W. Riley

Executive Summary

As we approach the 21st century, American public education is rising to meet a new challenge — high expectations and achievement for *all* students in *every* school. Across the nation, states and school districts are raising academic standards and making efforts to align curriculum, assessments, teacher training, and instruction with challenging standards. Educators are more focused than ever on helping students master the basics by creating smaller class sizes, improving teacher quality, encouraging parent involvement, expanding after-school and summer learning opportunities, increasing accountability for student performance, and modernizing our schools. The U.S. Department of Education is supporting these efforts with programs and resources to help improve teaching and learning, particularly in our most disadvantaged schools.

There are many reasons to be proud of these efforts. The latest results from the ongoing National Assessment of Educational Progress (NAEP) reported solid gains in math and reading achievement, including substantial improvement for low-achieving students and for those in the highest-poverty schools. For example, the 1998 NAEP reading assessment showed substantial gains for low-achieving students (those scoring in the bottom 10 percent and bottom 25 percent), suggesting that improvement among these students raised the national average of all fourth graders. Similarly, high-poverty schools have registered the greatest gains in NAEP math scores since 1992.

The National Education Goals Panel reports that between 1990 and 1996, 27 states significantly increased the percentage of 8th graders scoring at either the *proficient* or the *advanced* level on the NAEP math test. North Carolina, for example, more than doubled the percentage of its 8th graders scoring at the *proficient* or *advanced* levels on the NAEP math test. Connecticut registered the largest numerical gain of 10 points and the highest overall 4th grade score of 232 on the 1998 NAEP reading test.

Fixing Low-Performing Schools: Pathways to Progress

✔Set high expectations for students.
✔Hold schools accountable for performance.
✔Provide a safe learning environment.
✔Create leaders at school and district levels.
✔Let leaders lead.
✔Recruit and retain the best teachers.
✔Train teachers in instruction and curriculum.
✔Support students with extra help and time.
✔Involve the community in schooling.
✔Create smaller schools.
✔Close or reconstitute bad schools.

-Adapted from *Education Week*, January 8, 1998

Despite this progress, the data also reveal that there is still much work to be done. Year after year, NAEP results show that the academic performance of students in our nation's highest-poverty schools is several grade levels behind that of students in low-poverty schools. The children in our nation's poorest communities are at greatest risk of being left behind in an economy driven by expanded information, increased knowledge, and higher skills. Overcrowded classes, crumbling school buildings, and unqualified teachers are all too common in high-poverty schools, where students have the most pressing educational needs. In some of these schools, we know that teachers sometimes have low expectations of students and feel that they can do little to improve student performance. Often the environment in these schools is not conducive to learning — teachers are burnt out, school safety is a problem, and students and the community are disengaged. Many failing schools are located in impoverished communities where family distress, crime, and violence are prevalent. Limited financial, human, and program resources can leave these schools without the support they need to deliver high-quality instruction.

Turning around low-performing schools is not easy -- but it can be done. Across the U.S. there are examples of high-poverty, low-achieving schools, serving diverse communities and facing difficult obstacles, that have turned around and raised student performance:

- A few years ago, Harriet Tubman Elementary School in New York City, where 99 percent of students come from low-income families, was one of the lowest-performing schools in the city. After being assigned to the Chancellor's District — a special school district created for the lowest-performing schools — school leaders, parents, and teachers devised a plan for comprehensive change. The school adopted a comprehensive reform program including an intensive reading program. By 1997-98, it had been removed from the state's list of low-performing schools and reading scores had improved; the percentage of students performing at or above grade level on the citywide assessment rose from 30 percent (in 1996) to 46 percent.

- Hawthorne Elementary School in Texas is a high-poverty school where 96 percent of students qualify for free lunch and 28 percent of students have limited English language skills. In 1992-93, Hawthorne implemented a rigorous curriculum to challenge students in the early grades. In 1994, only 24 percent of students in the school passed all portions of the Texas Assessment of Academic Skills (TAAS). In 1998, almost 63 percent of students passed the TAAS, with the largest gains made by African American students.

- Despite the many well-documented cases of failing schools, there is evidence that high-poverty schools can be high-performing schools. Recent reports by the Education Trust, the University of Texas at Austin and others suggest that high-poverty schools are not doomed to failure. In a survey of more than 1000 top-scoring high-poverty schools with at least a 50 percent poverty rate, the Education Trust found that: 80 percent reported using standards to design instruction, assess student work and evaluate teachers; 78 percent provided extended learning time for students, particularly in reading and math; 80 percent had systematic ways to identify and intervene early for at-risk students; and a majority of schools were subject to accountability for performance. These high-performing, high-poverty schools also devoted a large proportion of funds to professional development focused on changing instructional practice and emphasized activities to encourage the involvement of parents in reviewing students' work.

Turning around low-performing schools involves making strategic decisions about instructional practices and focusing all school staff on aligning every aspect of school operations, from professional development to parent and community involvement, in order to support and sustain efforts to improve student achievement. However, low-performing schools rarely have the capacity to make these kinds of changes on their own. While much of what it takes to turn around a low-performing school can occur only within the school itself and with the cooperation and commitment of school staff, the federal government, states, and school districts must provide the critical impetus and support for the process of change.

This guide describes some of the strategies that states and districts are pursuing to help turn around low-performing schools. It also suggests concrete actions that state, district, and school leaders, as well as parents and community members, can take. The guide concludes with an inventory of federal resources that can support efforts to turn around low-performing schools.

Raising the Stakes: Setting High Standards for Performance

By setting high academic standards, holding all schools accountable for performance, and identifying schools that do not meet those standards, states and districts are taking important steps to raise expectations for all students. Across the nation, states and districts are raising the stakes by establishing procedures and standards to define expectations for students, identify poor performance, and hold schools accountable for student achievement. Today, nearly all States have standards in place. Thirty-six states produce "report cards" on the performance of schools.

States and districts also are sending strong signals to students about their own accountability for academic performance. Ten states and many districts, including Chicago, New York, and Boston, have committed to eliminating social promotion — the automatic passing of students from grade to grade regardless of whether they have mastered necessary skills. As part of setting explicit policies about student promotion, these states and districts are taking responsibility for making sure that students receive the help they need to meet academic requirements rather than be left back to repeat a grade.

Holding schools and students more accountable for performance is forcing states and districts to face the issue of low-performing schools head-on. Once these schools have been identified, how can states and districts help them do what it takes to improve student achievement?

Focus on Learning: Promising Strategies for Improving Student Achievement

The bottom line is for low-performing schools to make changes that will allow them to deliver high-quality curriculum and instruction so that all children reach challenging academic standards. This may seem straightforward, but it is not easy — for any school. Effective schools are places where there is a coherent program for teaching and learning and where all key elements in the school are aligned with that focus. In the case of low-performing schools, states and districts can provide assistance by:

- **Helping schools gain control of the learning environment.** This is a prerequisite to focusing on learning. Schools cannot effectively implement instructional changes if they do not first address student discipline, safety, and high absenteeism. Districts can help school leaders by instituting a "zero tolerance" policy for violence and drugs and by consistently and fairly enforcing such policies. School uniforms and effective classroom management strategies also can help create an environment conducive to learning. Gaining control of the school environment means more than just implementing get-tough discipline policies; it also involves showing respect for students and giving them responsibilities, as members of the school community, for maintaining a safe environment for learning.

- **Concentrating resources and efforts on providing students with challenging curriculum and high-quality instruction.** If students are to be held accountable for reaching high standards of performance, then they must be offered the kinds of curriculum and instruction that will help them meet that challenge. Districts must demand that all schools offer challenging coursework to all students. To help ensure that every student reaches high standards, states and districts can use resources to increase instructional time, extend the school day or the school year, and offer after-school assistance to students who need it.

- **Providing services so that young children come to school ready to learn.** A child's early environment is critical to intellectual development and school success. In recognition of this fact, states and school districts can help ensure that more children benefit from early childhood services. In addition to providing pre-kindergarten for children, many local education agencies are partnering with community organizations to implement family literacy programs that support early childhood education, school readiness, and parent involvement in learning activities.

- **Creating a professional development program aligned with the content of curriculum and focused on improving instruction.** Professional development is an often neglected element of the academic program in low-performing schools. To be effective, professional development activities must center on the classroom. Community School District #2 in New York City, for example, concentrates its professional development resources and time on engaging teachers in learning about the materials they teach and skills they need to improve classroom instruction. The district works to identify teachers that need assistance and helps to counsel teachers out of the profession if they do not improve.

- **Helping schools implement comprehensive school reform programs**. Creating coherent educational programs in low-performing schools usually requires changes in all aspects of a school, including its curriculum and academic standards, school governance, community-school relationships, staff development, technology, parent involvement, and services to meet children's needs. There are a number of research-based models and designs available to help schools address these multiple aspects of school effectiveness.

Building School Capacity: Systemic Support for the Process of Change

Research tells us that high-performing schools align curriculum, classroom practices, and professional development with high academic standards for all students. These schools also build a sense of teamwork among staff, work in partnership with parents and the community, and use performance data to inform choices and create a cycle of continuous improvement.

District support for these practices is key for building the capacity of schools to improve student achievement. Yet, low-performing schools are sometimes embedded in troubled school systems that cannot support the school improvement process.. Individual school efforts can be thwarted by districts that fail to provide leadership and that lack the focus and long-term commitment necessary for turning around low-performing schools.

Therefore, part of the process of building the capacity of low-performing schools involves setting priorities on the district level, such as:

- **Ensuring strong leadership at the school**. Districts must recruit principals who will serve as instructional leaders.

- **Promoting policies that encourage teacher commitment to reform**. Districts should hire teachers enthusiastic about change and willing to work in low-performing schools. Districts also can be flexible, allowing teachers the chance to leave a school if they do not want to participate in the school reform process. Teacher and staff commitment to improving schools can be fostered by efforts to create smaller schools, which generally have better communication and collaboration among staff — two ingredients that are essential for creating a shared purpose and collective responsibility for school improvement.

- **Using resources strategically**. Schools must make tough choices about the ways they allocate their resources if they are to focus on improving teaching and learning. Low-performing schools and school districts often have multiple competing priorities. While districts and schools may implement separate programs intended to address specific needs, the programs can be unfocused, disjointed, or work at cross-purposes. Pieced together, these multiple efforts often do not add up to a coherent whole. Districts must help schools coordinate and concentrate their resources on classroom instruction.

- **Helping schools use performance data to drive improvement.** Using data is important for identifying patterns of failure, diagnosing problems, and matching concrete solutions to educational needs. More and more, states and districts are analyzing and interpreting test scores and other student and school data to help identify causes for low performance, develop appropriate improvement strategies, and monitor progress as a strategy for continuous improvement.

- **Working in partnership with the community.** Schools cannot do their jobs alone. Low-performing schools, in particular, need the assistance of community stakeholders to raise student performance. Parent involvement is essential. Local businesses, colleges, and universities can be invaluable sources of support. Teacher unions can be cooperative allies in the process of change if they are invited to work in partnership to improve low-performing schools.

- **Providing incentives for change and support for innovation.** Districts can help support school-level change by following the lessons of high-performance organizations. In many states, local educators, parents, community members, and school board members can create public charter schools that operate under performance contracts that provide greater autonomy along with accountability for results. Public school choice and open enrollment policies also can provide incentives for school improvement. Districts also can provide incentives for school improvement by rewarding success.

Intervening in Chronically Low-Performing Schools

Because low-performing schools often have little capacity to make major reforms demanded by accountability policies, many states and districts are providing systemwide support for school improvement. Twenty-three states have policies for intervening and mandating major changes in chronically low-performing schools — from helping "redesign" schools to, as a last resort, reconstituting failing schools.

In many cases, intervention has been a collaborative experience. For example, New York State has developed a process to help redesign low-performing schools. Teams of teachers, board of education members, union representatives, parents, and curriculum experts led by district superintendents conduct four-day visits to low-performing schools to examine all aspects of school operations. Based on the recommendations of review teams, schools and districts develop corrective action plans. In New York City, the process includes assigning low-performing schools to the "Chancellor's District." A school assigned to the special district receives extra resources and technical assistance until the district determines that the school has the capacity and commitment to support its redesign plan.

Districts such as Chicago and San Francisco have employed reconstitution measures in attempting to turn around chronically low-performing schools. While the strategy encompasses a number of practices, it generally represents the extreme along a continuum of intervention strategies. In its basic form, reconstitution involves closing a school and reopening it with new school leaders and usually with new teachers and staff. Reconstitution policies are controversial and there is no conclusive data about whether reconstitution is an effective strategy for school improvement. Some believe that the threat of reconstitution has been an important force for leveraging change in chronically low-performing schools.

Regardless of the individual policy, state and district intervention in low-performing schools cannot succeed without the cooperation and commitment of those who actually work in the school. Turning around low-performing schools is difficult work. It requires high expectations, a focus on learning, a commitment to students, strong leadership, trust among school staff, and collective responsibility for student achievement. States and districts cannot impart these characteristics on schools, but they do have a critical leadership role in setting the context for change and raising the capacity of schools to acquire these attributes.

U.S. Department of Education Support

President Clinton and the U.S. Department of Education are committed to providing the support needed to help turn around low-performing schools. In order to help states, districts, and schools, the Department has developed programs and proposals designed to support the strategies discussed above. In particular, the Department's Elementary and Secondary Education Act (ESEA) reauthorization proposal -- the Educational Excellence for All Children Act of 1999 -- reflects what we know about the most promising strategies for raising student achievement. For example:

- School accountability measures in **Title I** and the **Education Accountability Act** would continue to help states develop rigorous systems for holding schools responsible for making continuous and substantial gains in student performance; publicly report on school performance; and identify and intervene in low-performing schools. However, the recent National Assessment of Title I indicates that states have limited capacity to deal with the number of schools that need assistance In 1998, only eight states reported that school support teams have been able to serve the majority of schools identified as in need of improvement. For this reason, the Administration's proposal for reauthorizing Title I would require States to set aside 2.5 percent of their Title I allocation to strengthen state and local capacity to turn around low-performing schools.

- The **Comprehensive School Reform Demonstration** program is now providing $145 million per year to more than 1600 schools to help create coherent educational programs in high-poverty schools that address all aspects of school operations, including curriculum and academic standards, school governance, community-school relationships, staff development, technology, parent involvement, and services to meet children's needs. The Department's proposal would reauthorize the Title I demonstration authority and the Fund for the Improvement of Education to provide stable support for continuing reforms, enable the program to be fully implemented, and allow for the evaluation of its effect on student achievement.

- Programs such as **Even Start** are already supporting early childhood education, school readiness, and parent involvement in learning with 750 Even Start projects throughout the U.S., serving over 34,000 families. Enacted in 1998, the **Reading Excellence Act** is providing $260 million in assistance to help 500,000 children learn to read using scientifically-based reading strategies. The reauthorization proposal continues support for the Department's goal of helping all student read well and independently by the end of the third grade.

- The **Class Size Reduction and Teacher Quality Initiative** aims to help schools improve student learning by hiring 30,000 highly qualified teachers so that children — especially those in the early elementary grades — can attend smaller classes. School districts are currently receiving $1.2 billion in funds that is enabling them to recruit, hire, and train teachers for the 1999-2000 school year.

- The ESEA reauthorization proposal includes the **Teaching to High Standards Initiative** which would help educators apply high standards to improve learning in American classrooms. The initiative would support state and local efforts to: align curricula and assessments with challenging state and local content standards, provide teachers with sustained and intensive high-quality professional development in core academic content areas, support new teachers during their first three years in the classroom, and improve teacher quality and help ensure that all teachers are proficient in relevant content knowledge and teaching skills.

- The **21st Century Community Learning Centers** program is funding school-community partnerships to expand after-school and extended learning programs for school-age children. In three years' time, the program has expanded from a $1 million demonstration program in fiscal year 1997 to a $200 million program that will serve about 400,000 children and over 200,000 adults this year in 1999.

- Under the new **GEAR UP** program (Gaining Early Awareness and Readiness for Undergraduate Programs) the Department is spending $120 million to support early college awareness activities by helping inform students and parents about college options and financial aid, promoting rigorous academic coursework, and providing comprehensive services—including mentoring, tutoring, counseling, and other activities such as after-school programs, and summer academic and enrichment programs.

- Public school choice and open enrollment policies are also providing incentives for school improvement through the **Public Charter Schools** and **Magnet Schools** programs. To help ensure that public school choice contributes to excellence and equity for all children, **OPTIONS: The Opportunities To Improve Our Nation's Schools** program would encourage the development of high-quality public school choice across the nation. The program would promote choices that would benefit all students by reducing barriers to effective choice, creating new diverse learning environments, and helping decrease the isolation of students by racial, ethnic, and economic backgrounds.

- Turning around low-performing schools also requires attention to the physical conditions of our nation's schools. According to recent figures, a record 52.7 million children are enrolled in elementary and secondary schools, and this number will climb to 54.3 million by 2008. The average public school in America is 42 years old. The Administration's **School Modernization** proposal would help state and local governments repair or replace 6,000 overcrowded, out-of-date, and unsafe schools with Federal tax credits to pay the interest on nearly $25 billion in bonds.

As we face a new century, it is time for America to renew its commitment to future generations. There is a role for each and every member of the school community in raising our expectations for all students, providing a safe learning environment, aligning educational resources and instruction with high academic standards, and choosing long-term improvement strategies. This guide provides examples of promising state, district, and school practices for helping children to learn, and suggests concrete steps that state and local policy makers, school leaders, parents, and community stakeholders can take to fix low-performing schools. Through these efforts, we can work together to make all schools places where students strive toward high levels of learning and achievement.

DRAFT

FACILITY CONDITIONS AND STUDENT TEST PERFORMANCE IN THE MILWAUKEE PUBLIC SCHOOLS

Prepared for

Council of Educational Facility Planners International
9180 E. Desert Cove Drive, Suite 104
Scottsdale, Arizona 85260

Prepared by

The Lewis Group
2240 McCoy Road
Columbus, Ohio 43220

August 2000

DRAFT

Table of Contents

Page

Acknowledgments iii

Executive Summary iv

Introduction 1

Data 3

Facility Scores 3

Wisconsin Student Assessment System 7

Indicators of Student Characteristics 8

Internal Consistency of the Data 10

Multiple Regression Analyses 14

Conclusions 22

Appendix 23

References 36

List of Tables

Table Page

1 Means for Original and Standardized Measures of School Facilities 6

2 Correlation of Age of Building with Facility and Adequacy Scores 7

3 Correlations of the Wisconsin Student Assessment System Scores for 1996, 1997, and 1998 11

4 Correlations of Indicators of Student Characteristics 12

5 Indicators of Student Characteristics Correlated with WSAS Test Scores for 1996, 1997, and 1998 13

6 Regression Coefficients for Dependent Variable Mathematics 96Z with Reading96Z in and Out of the Equation 15

DRAFT

7	Regression Coefficients for Net Independent Effects of School Measures and Percentage of Students Eligible for Free or Reduced Lunches on WSAS Scores for 1996, 1997, and 1998	16

Appendix Table

A-1	Dependent Variable: Mathematics 96Z	24
A-2	Dependent Variable: Language 96Z	25
A-3	Dependent Variable: Science 96Z	26
A-4	Dependent Variable: Social Studies 96Z	27
A-5	Dependent Variable: Mathematics 97Z	28
A-6	Dependent Variable: Language 97Z	29
A-7	Dependent Variable: Science 97Z	30
A-8	Dependent Variable: Social Studies 97Z	31
A-9	Dependent Variable: Mathematics 98Z	32
A-10	Dependent Variable: Language 98Z	33
A-11	Dependent Variable: Science 98Z	34
A-12	Dependent Variable: Social Studies 98Z	35

List of Figures

Figure		Page
1	Net Change in 1996 Mathematics Score Associated with One-Point Change in Variables Listed	17

DRAFT

Acknowledgments

This report presents findings from analyses of data provided by the Milwaukee Public Schools. The Council of Educational Facility Planners, International is indebted to Ed McMilin, facilities planner with the Milwaukee Public Schools, for making the data available, and for his commitment to this study. Ed's tireless efforts come from his conviction that facilities do make a difference. We are grateful to Ed for his belief in this project and his determination to make it happen. The Council also gratefully acknowledges Jim Bloom, Aquine Jackson, Christine Lai, Kay Mantilla, Tim McElhatton, Stan Pauli, and Mike Turza of the Milwaukee Public Schools for their efforts in preparing the data for this study. CEFPI would like to thank the Milwaukee Public Schools and acting director Deanna Housfeld for allowing CEFPI access to the district's data for this study.

This study was funded by the CEFPI, under the Where Children Learn project. Special appreciation to the CEFPI regions, chapters and individuals that donated funds to support Where Children Learn.

Thank you to Dr. Mary Benin of Arizona State University for reviewing a draft of this study and providing feedback.

CEFPI offers a special thanks to all CEFPI Research Committee members over the course of this project for their insight and advisement, particularly Hugh Skinner and Steve Young whose guidance and leadership helped make this a reality. CEFPI also thanks members of the 2000 Research Committee who reviewed preliminary drafts of this report. Finally, the Council wishes to acknowledge the hard work and dedication of Council staff member Elisa Warner who supervised the completion of this important project.

DRAFT

Executive Summary

This report presents an analysis of the relationships between measures of the physical facilities and educational adequacy of 139 buildings in the Milwaukee Public Schools system and standardized test data from students who attended these schools. The facility measures are from a study conducted in 1991 by the Construction Control Corporation. The test data are from the Wisconsin Student Assessment System fourth, eighth, and tenth grade tests that were administered in 1996, 1997, and 1998. In addition to the facility and test data, other information about the schools that was used in the analysis included the percentage of students from different racial/ethnic groups, attendance, suspension and mobility rates, and percentage of students eligible for free or reduced-price lunches.

Multiple regression analysis was used to determine the net, independent effect of the facility measures on test performance. The Wisconsin Student Assessment System consists of five tests, Reading, Mathematics, Language (including writing), Science and Social Studies. In 1996, the scores for each school were the percentile rankings of the school mean on the national norms for the tests that were administered. In 1997 and 1998, the measures of student performance at each school were the percentage scoring at or above the level defined as *proficient* for the three grades.

Reading scores are highly correlated with measures of individual ability and are the single best predictor of school performance. In the analyses presented in this report, Reading scores were used to control for differences in individual ability. With this control in the analysis, measures of school facilities explained as much of the differences in test performance across schools as were explained by indicators of family backgrounds and school attachment. Reading scores together with measures of school facilities, family background, and school attachment were able to explain between 75 and 92 percent of the differences across schools in test scores for the three years of testing.

Out of 36 estimates of the net, independent relationships of measures of school facilities with performance on the Wisconsin tests, 11 were found to be significant. Significant relationships were found between facility measures and all four of the tests. Differences in the facility measures typically explained about 10 to 15 percent of the differences in test scores when the influences of the other variables were statistically controlled. When simple one-to-one

DRAFT

correlations were calculated between the facility measures and test scores, there were no significant relationships. Multiple regression was needed to detect relationships that were hidden by the effects of other variables.

Out of 48 similar estimates of the relationship between measures of family background (mobility rates and eligibility for free/reduced lunches) and school attachment (attendance and suspension rates) with test performance, 9 were found to be significant. Differences in the measures of family background and school attachment that yielded significant relationships explained between 8 and 28 percent of the differences in test scores when other variables were controlled.

The results strongly imply that there is a relationship between facility conditions and performance on standardized tests. The evidence, however, is not fully consistent across the three years of test data. Very few statistically significant relationships were found between any of independent variables, except the Reading measure, and test performance in the 1998 data. Internal analyses of the data could detect no explanation for the low number of significant relationships in the data from this year. One possible explanation is that as the time period between the facility measures and test data increases, the chances of finding relationships decrease. This may also be the case for the measures of family background and school attachment. If all the measures were from the same school year, a higher proportion of significant relationships might be found.

With the complexity of the learning process and the number of factors that can influence it, it may not be possible to produce a definitive estimate of the effect of facility conditions on student achievement. Overall, the evidence–both previous research and this study–strongly implies such a relationship exists, but it continues to frustrate attempts to chart its dimensions.

DRAFT

INTRODUCTION

The relationship between the quality of the school facilities and the learning of students has been a source of controversy since the mid-1960s. Prior to then, few questioned that the quality of the educational process influenced educational outcomes. Good schools, curriculum, and teachers were assumed to produce well-educated students. In 1966, James Coleman and others published *Equality of Educational Opportunity.* This classic study reported the surprising and controversial finding that measures of traditional inputs into the educational process had little impact on the academic performance of students. In the words of the report:

> It appears that variations in the facilities and curriculums of the schools account for relatively little variation in pupil achievement insofar as this is measured by standard tests. (p. 22)

Since the Coleman report, the relationship between the physical condition of schools and student achievement has been examined from a variety of perspectives. Bowers and Burkett (1989) studied the effect of the age of school buildings. Berner (1993) asked parent volunteers (maintenance workers, engineers, architects) to evaluate the condition of their children's schools. Earthman, Cash, and Berkum (1995) collected standardized questionnaire data from school principals. After obtaining various measures of schools, each of these studies then compared achievement test scores from schools with better and worse conditions. Maxwell (1999) used a slightly different approach; she compared test scores before and after schools underwent renovation.

Typically all of these studies have found a statistically significant relationship: better conditions are associated with higher achievement scores. In most cases, however, relatively little of the differences in scores can be attributed to the differences in facility conditions. When the complexity of learning and the number of factors that influence it are considered, the difficulty of estimating the effects of facilities is not surprising. Most studies are able to control only a few of the influences on learning, and, as a result, can explain relatively little of the total variability in test scores.

Three recent reviews have synthesized the available evidence. (Duke 1998, Earthman and Lemasters 1998, and Schrag 1999). Duke states: ". . . the studies that have been conducted suggest that there may be a relationship between the condition of facilities and learning." (p. 11). Earthman and

Lemasters are more definitive: "As the condition of the facility improved, achievement test scores improved." (p. 10). Schrag reviewed the evidence but did not reach a summarizing conclusion.

The present study examines the relationship between the condition of 139 schools in the Milwaukee Public Schools and the test scores of students from these schools. The study includes direct or proxy measures of several of the factors that influence learning. All the data used in the study were provided by the Milwaukee Schools. The facility scores were produced by the Construction Control Corporation for a study conducted in 1991. The test scores are from students who were tested while they attended the fourth, eighth, and tenth grades in 1996, 1997, and 1998. The Milwaukee Schools also provided other information about the characteristics of the students who attend the 139 schools including enrollment by racial/ethnic group, attendance, truancy and suspension rates, mobility and the percent of students eligible for free or reduced price lunches.

The first step in the study was to match these separate data sets by school and to merge the data to be used in the analysis. The first critical decision in the analysis was to merge the data across grade level. We did this because there are only 18 middle and 15 high schools in the data set. We had a possibility of as many as 20 independent variables for use in multiple regression, and the ratio of schools to variables was too low. For multiple regression to produce reliable results, it is necessary to have at least three times the number of observations as there are independent variables. Combining the elementary, middle, and high schools yielded a total of 139 observations which greatly increased the power of the analysis and the chances of finding statistically significant relationships between the independent and dependent variables.

The report is organized as follows. First we describe the data provided by the Milwaukee Public Schools. We then present analyses conducted to examine the internal consistency of these data. Before conducting the multiple regression analyses, we wanted to determine if the data have the relationships that would be expected on the basis of existing knowledge. We then present the multiple regressions that tested if the measures of school facilities had independent relationships with the test scores when other characteristics that are associated with test performance were statistically controlled.

DATA

Three separate kinds of data were provided by the Milwaukee Public Schools: facility scores, test results at the school level, and indicators of the characteristics of students in the 139 schools used in the analysis. We give most attention to the facility scores produced by the Construction Control Corporation. We then describe the Wisconsin Student Assessment System (WSAS), a battery of five standardized tests that are administered when students are in the fourth, eighth, and tenth grades. We also present the definitions of the student characteristics indicators.

These data provide some the best measures that have been used in analyses of this type. Unfortunately, they are not all from the same school year. There is a five year gap between the facility study and the first year in which test scores were available for all three grade levels. The student characteristic indicators are available for the 1994-95 and 1995-96 school years, one or two years before test scores were available. The multiple regression analyses presented below found most of the statistically significant relationships between facility and test scores for the tests administered in the 1996-97 school year, the one closest to the year in which the facility scores were produced. If all the measures had been available for the same school years, the findings across testing years may have been consistent.

Facility Scores

Any study seeking to relate school facilities to academic achievement is critically dependent on the accuracy of the measures of the facilities. The Construction Control Corporation study, commissioned by the Milwaukee Public Schools (MPS), was carefully conducted to yield valid measures. Four separate measures were produced: Existing Condition Total, Existing Condition Adjusted, Educational Adequacy Total, and Educational Adequacy Adjusted. The manner of producing each of these scores is described.

Existing Conditions. The Existing Condition scores are based on direct examinations of the schools that were conducted by teams made up of MPS staff from the Department of Facilities and Maintenance Services and staff from the MPS Program Architect. The instructions given these teams are described as follows in the report of study:

> The survey teams were charged with applying judgement factors which would assess the "general health" of the facility. Chronic problems and the typical, normal conditions of each component were to be rated, with emphasis on the functional integrity of the particular component being assessed. (Construction Control Corporation 1991, p. 5)

The teams were trained to use an evaluation form developed by the Construction Control Corporation. This form called for ratings on a five-point scale defined as Poor, Marginal, Average, Good, and Excellent. These rating were then multiplied by weighing factors to calculate a total score for the facility. The weighting yielded scores that could range from 1,000 for the poorest school to 5,000 for an excellent school. These weighted scores were then adjusted. The rationale for this adjustment is explained in the report as follows:

> At this point an overall score depressor was applied to reflect the statistical probability of chronic deficiencies due to age even when overall appearance merits a higher score. In the specific instance of MPS, facilities have been maintained in a condition which is exceptional for the age of the facility. Therefore, in order to reconcile the age effect among the facilities and account for age sensitive, depreciating components which would not otherwise be surveyed, an adjustment factor was applied to the raw score based on age category of the major portion of the facility. The adjustment was made by depressing the raw score of facilities as follows:

Age	Deduct
60 + years	1,000
50 - 60	750
40 - 50	500
0 - 40	0

> (Construction Control Corporation 1991, pp. 5-6)

Results of the multiple regression analysis, to be presented below, indicate that this adjustment lowered the scores too much. Significant positive relationships were found between the Existing Conditions Total scores and WSAS test scores, and significant negative relationships were found for the adjusted scores.

DRAFT

Educational Adequacy. The Educational Adequacy scores were produced in a similar manner but the teams that made the adequacy ratings were composed of teachers and curriculum specialists from the MPS faculty and staff. There were a total of five teams, one for the high schools, one for the middle schools and three for the elementary schools. The teams rated the schools using a form developed by Construction Control Corporation. The schools were rated on the degree to which they conformed to established design standards for each facility type (conformity), and their adequacy in accommodating current curricula, and their capability for alternative use (functional performance).

Conformity with established standards was rated as Inadequate, Below, Equal, Above, and Exceptional. Functional Performance was rated as Unacceptable, Inferior, Average, Good, and Excellent. These ratings were multiplied by weighting factors to yield scores from 1,000 to 5,000, the same range as the Existing Condition scores. These weighted scores were also adjusted. In this case, the size of the space and student/teacher ratios were used to adjust the Functional Performance scores.

Table 1 presents the mean facility scores for each educational level that were produced using the Construction Control Corporation method and standardized scores derived from the original scores. The standardized scores were calculated to make comparisons across the four measures easier. The standardized scores all have a mean of 100 and a standard deviation of 10. Any variable that is reported as a standardized score has a "Z" added as the final letter in its label.

The adjustment of the Educational Adequacy scores did not produce as much a change as the adjustment to the Existing Condition scores. Table 2 shows that the Existing Condition Total (EC Tot.) and Adjusted (EC Adj.) scores correlated at $r = .68$, and the Educational Adequacy Total (EA Tot.) and Adjusted (EA Adj.) correlated at $r = .89$. The strong effect of age on the Existing Condition Adjusted score is show by the negative correlation of -.88. The adjusted Existing Condition scores is, essentially, simply another measure of the age of the buildings: as the age of the building increases, the Existing Conditions Adjusted score declines.

When two measures are highly correlated, they should not both be entered into a multiple regression equation. In the regressions analyses that are presented below, age was not entered and the Existing Conditions Adjusted

DRAFT

Table 1

Means for Original and Standardized Measures of School Facilities

Level		EC Tot.	EC Adj.	EA Tot.	EA Adj.
Elementary					
Original	Mean	3353.19	2850.64	2562.68	2514.21
	Number	98	98	98	98
	Stan. Dev.	203.34	591.22	431.98	519.20
Standardized	Mean	98.97	99.49	98.92	100.97
	Number	98	98	98	98
	Stan. Dev.	8.29	9.58	8.60	7.79
K-8					
Original	Mean	3374.63	2530.88	2771.50	2677.75
	Number	8	8	8	8
	Stan. Dev.	554.76	890.42	986.77	1102.36
Standardized	Mean	99.84	94.31	103.08	103.42
	Number	8	8	8	8
	Stan. Dev.	22.61	14.42	19.65	16.54
Middle School					
Original	Mean	3402.00	3027.00	2629.83	2199.28
	Number	18	18	18	18
	Stan. Dev.	166.13	511.39	504.75	792.30
Standardized	Mean	100.96	102.35	100.26	96.24
	Number	18	18	18	18
	Stan. Dev.	6.77	8.2830	10.05	11.89
High School					
Original	Mean	3517.47	3100.80	2872.33	2205.67
	Number	15	15	15	15
	Stan. Dev.	305.61	682.63	540.51	967.10
Standardized	Mean	105.67	103.54	105.09	96.34
	Number	15	15	15	15
	Stan. Dev.	12.46	11.06	10.76	14.51
Total					
Original	Mean	3378.47	2882.07	2616.81	2449.55
	Number	139	139	139	139
	Stan. Dev.	245.31	617.40	502.16	666.30
Standardized	Mean	100.00	100.00	100.00	100.00
	Number	139	139	139	139
	Stan. Dev.	10.00	10.00	10.00	10.00

score served as the measure of age. For the same reason both the Educational Adequacy Total and Adjusted scores were not used. Because they correlate so highly, only the Total score was used.

Table 2. Correlation of Age of Building with Facility and Adequacy Scores

	Age	EC Tot.	EC Adj.	EA Tot.	EA Adj.
Age	1.00				
EC Tot.	-.39	1.00			
EC Adj.	-.88	.68	1.00		
EA Tot.	-.48	.49	.54	1.00	
EA Adj.	-.36	.32	.40	.89	1.00

NOTE: All correlations are based on 139 schools and are significant at the 0.01 probability level or less (2-tail).

Table 2 make reference to “2-tail.”in connection with the probability level. Tests of significant difference that are based on the normal probability curve are either 1-tail or 2-tail. The 1-tail test is appropriate if before the data are examined, the hypothesis being tested predicts the direction in which the results are expected to be different from chance. The overall hypothesis of this study is that as facility scores increase test scores will also increase. This hypothesis predicts the direction of the relationship and consequently a 1-tail test is appropriate and is used in this report. Any relationship that is labeled *statistically significant* refers to the .05 probability level of a 1-tail test.

Wisconsin Student Assessment System Scores

The WSAS consists of three sets of standardized tests that are administered to students when they are in the fourth, eighth, and tenth grades. The tests are designed to yield scores reflecting knowledge in reading, mathematics, language arts (including writing), science, and social studies.

The scores that were used for the 1996 analysis are somewhat different than those used in 1997 and 1998. The scores for 1996 are the percentile rankings of the schools on the national norms for the tests. For 1997 and 1998 the scores are the percent in each school that performed at or above the level defined as *proficient*. For each grade level and content area, the Office of Education Accountability of the Wisconsin Department of Public Instruction

(1997) has established standards that define four different levels of performance: minimal, basic, proficient, and advanced. For each school in the state, the Department calculates the percentage of students who performed at or above the level defined as proficient. These percentages were reported for the 139 schools in the MPS for which facility data were available, and they constitute the student outcome data that were used in the analysis for the 1997 and 1998 school year.

As with the facility scores, the original data reported by the MPS were converted to standardized scores with a mean of 100 and a standard deviation of 10. The standardized score labels have a "Z" as their final letter.

Indicators of Student Characteristics

In addition to the facility and test scores, the MPS provided data that reflect the characteristics of student attending the schools and the socioeconomic status of their families. These included attendance, truancy, suspension, mobility, and eligibility for free or reduced price lunches. These are the definitions for these indicators:

Attendance: Total days of attendance divided by Total possible days of attendance

For each of the following measures, the denominator is the total number of students enrolled on the third Friday of the school year:

Truancy: Number of students absent for either 10 or more consecutive days or 10 or more days during a semester

Suspension: An unduplicated count of the number of students suspended from the school, (multiple suspensions for the same student are counted only once per school)

Mobility: Total students who entered or exited a school after the third Friday

Free/reduced lunch: Total students receiving free or reduced price lunches

All of these indicators were converted to standardized scores with a mean of 100 and a standard deviation of 10.

Information was also provided on the racial/ethnic composition of the enrollment at each of the 139 schools for the 1995-96 school year.

The reader should note that the unit of analysis for this study was the individual school, not the individual student. Because the data were at the school level, there was the possibility that the scores for all schools could be quite similar. If students with varying levels of individual ability and diverse family backgrounds–the two primary determinants of test performance–were randomly distributed across schools, the percentage proficient at each school would be very close to the mean for all 139 schools.

The actual distributions of test scores and student characteristics were far from randomly distributed. Reading scores are the single most accurate indicators of the ability to do academic work. The percentages in each school that scored at the proficient level or above in Reading ranged from 12 to 98 percent. The mobility of enrollment and the percentage of students who received free or reduce price lunches ranged from 0 to 98 percent. The school-level variation in the characteristics of the students attending the 139 schools and in their performance on the separate tests spanned the full range of most of the measures.

INTERNAL CONSISTENCY OF THE DATA

This section of the report discusses the analyses we conducted to test the internal consistency of the data. We wanted to determine if the various measures had the kinds of relationships with one another that would be expected on the basis of existing knowledge. We expected, for example, that scores across the five tests in the WSAS would be highly correlated. Students in schools who scored well on one test would be expected to score well on the other tests, and students in schools that did poorly on one test would be expected to do poorly on the other tests. We further expected that the scores of students who took the tests in one year would correlate with the scores of students who took the tests in subsequent years. We expected this because the characteristics of students who attend a school usually do not change greatly from year to year. Elementary schools, in particular, tend to serve neighborhoods with similar socioeconomic characteristics which change fairly slowly from year to year. And elementary plus K-8 schools make up three-fourths of the schools in this study.

Table 3 shows that the expected relationships were found in the WSAS data. The first three sets of rows show the correlations of different tests for the same year. The bottom set of rows show the correlations of the same test for different years. The correlations across tests for the same years are quite high. This reflects a strong tendency for schools that scored highly on one content area to also score highly on the other areas.

The schools also tend to have similar scores on the same tests across years, but not to the degree they have similar scores the same year across tests. The correlations of the different tests for the same years indicate that students perform similarly on each of the tests. The correlations of the same tests across years reflect the tendency of schools to serve students who have similar levels of test performance in different years.

In addition to determining if the tests had the relationships expected, we examined the relationships among indicators that reflect the characteristics of students that attend the various schools. These variables are shown in Table 4. These indicators correlate highly across the years for which we have data. The three years of attendance data correlate at an average $r = .95$; the mobility data correlate $r = .89$, and the free/reduced lunch data correlate $r = .97$ across two years. Truancy rates are essential the reverse of attendance, yielding high negative correlations. Suspension rates have a fairly high positive correlation with truancy and negative correlations of about the same magnitude with attendance. As attendance increases, suspension rates decrease. As the mobility of enrollments increases, attendance decreases and suspensions increase. The percentage of students eligible for free and reduced lunches, however, has no significant relationships with attendance, truancy, or suspension, but a fairly strong relationship with mobility. All of these relationships are consistent with prior expectations.

Table 3. Correlations of the Wisconsin Student Assessment System Scores for 1996, 1997, and 1998

	Reading	Mathematics	Language	Science	Social Studies
1996					
Reading	1.00				
Mathematics	.85	1.00			
Language	.94	.85	1.00		
Science	.84	.88	.84	1.00	
Social Studies	.89	.89	.87	.91	1.00
1997					
Reading	1.00				
Mathematics	.86	1.00			
Language	.91	.87	1.00		
Science	.84	.89	.83	1.00	
Social Studies	.73	.70	.70	.77	1.00
1998					
Reading	1.00				
Mathematics	.84	1.00			
Language	.95	.85	1.00		
Science	.80	.91	.80	1.00	
Social Studies	.91	.84	.90	.82	1.00
1996 with					
1997	.77	.70	.74	.71	.70
1998	.67	.48	.72	.53	.76
1997 with					
1998	.78	.75	.71	.68	.54

NOTE: All correlations are based on 139 schools and are significant at the 0.01 level or less (2-tailed).

DRAFT

Table 4. Correlations of Indicators of Student Characteristics

	Attendance 1994	Attendance 1995	Attendance 1996	Truancy	Suspens.	Mobility Rate 1995	Mobility Rate 1996	Free/Red Lunch 1995	Free/Red Lunch 1996
Attend 94	1.00								
Attend 95	.97	1.00							
Prob.	.00								
Attend 96	.92	.96	1.00						
Prob.	.00	.00							
Truancy	-.88	-.87	-.87	1.00					
Prob.	.00	.00	.00						
Suspen.	-.59	-.67	-.65	.51	1.00				
Prob.	.00	.00	.00	.00					
Mobil 95	-.42	-.38	-.37	.31	.06	1.00			
Prob.	.00	.00	.00	.00	.46				
Mobil 96	-.40	-.37	-.36	.29	.10	.89	1.00		
Prob.	.00	.00	.00	.00	.24	.00			
Lunch 95	-.01	.02	-.02	-.13	.01	.41	.39	1.00	
Prob.	.90	.86	.85	.12	.94	.00	.00		
Lunch 96	.01	.02	-.01	-.14	.01	.39	.38	.97	1.00
Prob.	.95	.77	.88	.11	.88	.00	.00	.00	

Note: All correlations are based on 139 schools. The probabilities (Prob.) are for 2-tail tests.

Our final test of the internal consistency of the data was to correlate the student characteristic indicators with the WSAS scores. These results are shown in Table 5. Once again, almost all of the relationships are significant and in the expected directions. The measures of truancy, suspension, mobility and the percentage of students eligible for free/reduced lunch have substantial negative relationships with almost all the tests. Attendance, in contrast, has a substantial positive correlation. These results are consistent over the three years of test data.

Table 5. Indicators of Student Characteristics Correlated with WSAS Test Scores for 1996, 1997, and 1998

	Truant	Suspension	Attendance 1996	Mobility 1996	Free/Red Lunch 1996
Reading					
1996	-.27	-.26	.40	-.52	-.50
1997	-.41	-.38	.53	-.43	-.47
1998	-.44	-.42	.53	-.41	-.36
Mathematics					
1996	-.06	-.19	.23	-.44	-.56
1997	-.40	-.42	.52	-.38	-.42
1998	-.58	-.63	.67	-.29	-.14
Language					
1996	-.29	-.40	.46	-.45	-.49
1997	-.36	-.42	.50	-.40	-.47
1998	-.47	-.41	.56	-.42	-.35
Science					
1996	-.17	-.26	.29	-.44	-.61
1997	-.44	-.36	.52	-.43	-.43
1998	-.72	-.69	.78	-.27	-.12
Social Studies					
1996	-.31	-.28	.42	-.50	-.53
1997	-.04	-.03	.17	-.44	-.63
1998	-.42	-.39	.52	-.42	-.35

Note: All correlations are based on 139 schools. In contrast with the other tables in this report, the shaded cells are ***not significant***. All others are significant at the .05 probability level (1-tail) or less, and most are significant at the .001 level.

MULTIPLE REGRESSION ANALYSES

Having established that the test and student indicator data had substantial internal consistency, we were prepared to determine the relationship between test performance and measures of the condition and educational adequacy of the schools the students attended at the times they took these tests. Multiple regression was used because it provides estimates of the effect of each independent variable upon the dependent variable while holding the effects of all other variables in the equation constant.

The equations were based, as far as possible, on Walberg's (1980) model of educational productivity. Although measures were not available for all the factors in the model, those that were used typically explained 80 to 90 percent of the variation in test performance across the 139 schools. This is far larger percentage of explained variance than was found in the previous studies discussed in the Introduction section of this report.

Much of the strength of the model used in the analysis of the MPS data came from the inclusion of the WSAS Reading test as an *independent* variable that was regressed against the other WSAS tests as *dependent* variables. The decision to include Reading as an independent variable increased the explanatory power of the model and the probability of finding statistically significant relationships between the measures of school facilities and the percentage of students in the schools that scored at the proficient level or above on the other four tests.

The increase in power from including Reading as an independent variable is shown in Table 6. This table compares the results from two multiple regression equations one of which included the 1996 Reading score and the identical model without this variable. The adjusted R Square is the percentage of variability in the dependent variable, 1996 Mathematics scores, that is explained by the independent variables. With Reading in the equation, the adjusted R Square is .805; without Reading it is .445, a drop of almost half.

Table 6 identifies the facility score variables with capital letters and all have "Z"s as their final letters, indicating that they are standardized scores. These are the same labels used in Appendix Tables A-1 through A-12: ECTOTZ is the label for Existing Conditions Total, ECADJZ is Existing Conditions Adjusted, and EATOTZ is Educational Adequacy Total. Educational Adequacy Adjusted was not included in the model because of its high correlation ® =.89) with Educational Adequacy Total.

DRAFT

Table 6

Regression Coefficients for Dependent Variable Mathematics 96Z with Reading96Z In and Out of the Equation

Independent Variables	With Reading			Without Reading		
	Beta	t	Probability	Beta	t	Probability
ECTOTZ	.15	2.39	.01	.23	2.11	.02
ECADJZ	-.16	-2.65	.00	-.18	-1.78	.04
EATOTZ	.09	1.90	.03	.09	1.09	.14
SuspensionZ	.00	.08	.45	-.12	-.98	.16
Attendance96Z	.10	1.04	.15	.42	2.53	.01
Mobility96Z	.05	.91	.18	-.17	-1.98	.02
F/R Lunch96Z	-.12	-1.55	.06	-.21	-1.68	.05
African American	1.28	1.72	.04	2.68	2.15	.02
Asian	.32	1.96	.02	.52	1.93	.03
Hispanic	1.04	2.09	.02	1.89	2.26	.01
White	.95	1.74	.04	2.17	2.39	.01
Elementary	-.25	-2.10	.02	-.46	-2.28	.01
Middle School	-.19	-2.39	.01	-.22	-1.66	.05
Reading96Z	.82	15.20	.00			

Model Summary

Model	R	R Square	Adjusted R Square	Standard Error
With Reading	.91	.82	.80	4.42
Without Reading	.70	.50	.44	7.45

Table 7 presents a summary of the results of the school facility measures regressed against the three years of test data. The model shown in Table 6 with Reading included was run with the four other tests administered in the years 1996. 1997, and 1998 as the dependent variables. The facility measures used in all the regressions are the same, the scores produced in 1991 by the Construction Control Corporation. The results for the full regression model for each of the WSAS tests in each of these years are appended as Appendix Table A-1 through A-12.

D R A F T

Table 7

Regression Coefficients for Net Independent Effects of Facility Measures and Percentage of Students Eligible for Free or Reduced-Price Lunches on WSAS Scores for 1996, 1997, and 1998

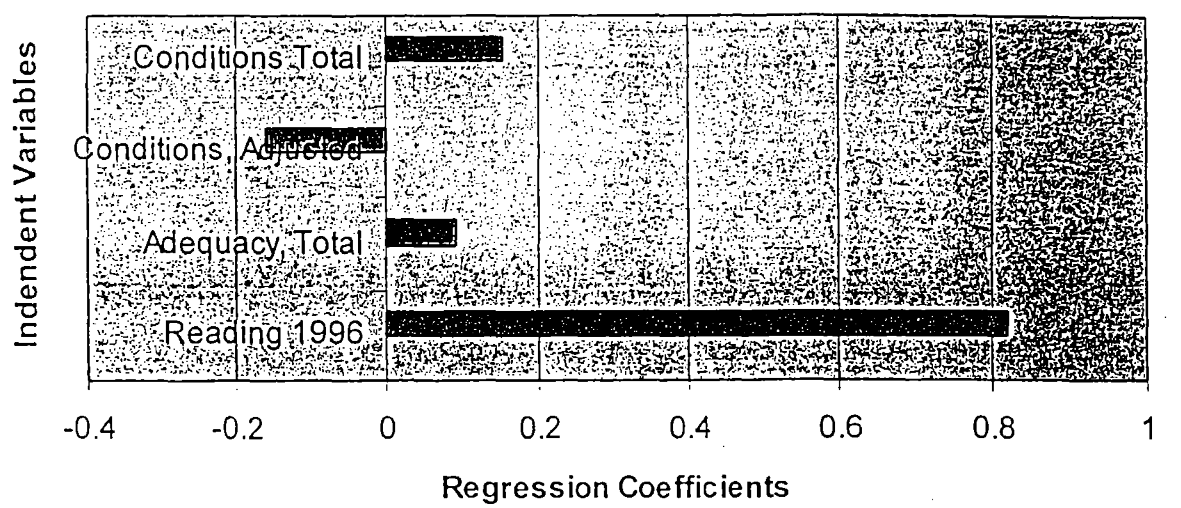
Facility Measures	Mathematics		Language		Science		Social Studies	
	Beta	t	Beta	t	Beta	t	Beta	t
1996								
ECTOTZ	.15	2.39	.02	.51	.14	1.94	.07	1.24
ECADJZ	-.16	-2.65	-.01	-.27	-.06	-.95	-.08	-1.32
EATOTZ	.09	1.90	.00	.12	.03	.56	.09	1.96
1997								
ECTOTZ	.08	1.14	.07	1.13	.13	1.90	.12	1.79
ECADJZ	-.08	-1.27	-.15	-2.61	-.12	-1.93	-.14	-2.15
EATOTZ	.06	1.19	.03	.68	.13	2.59	.06	1.18
1998								
ECTOTZ	.08	1.52	.03	.64	.02	.44	.04	.74
ECADJZ	.02	.37	-.03	-.96	.04	.87	-.03	-.54
EATOTZ	-.04	-1.08	-.00	-.07	-.01	-.26	.03	.61
Free/Reduced Lunch96Z with								
1996 scores	-.12	-1.55	-.08	-1.74	-.28	-3.40	-.21	-3.00
1997 scores	-.16	-2.00	-.12	-1.73	-.12	-1.48	-.06	-.76
1998 scores	.08	1.25	.00	.02	.00	-.00	.06	.79

Note: All regressions are based on 139 schools. Shaded cells show coefficients that are significant at the .05 probability level or less, with a 1-tail test.

The shaded cells indicate relationships that are significant at the .05 probability level or less. The coefficients are standardized and show the amount of change in the outcome measures that would be expected by a one-point (1.00) change in the standardized facility measures.

It is likely that most readers of this report will not be familiar with interpreting regression coefficients. Figure 1 may facilitate the understanding of these values.

Figure 1. Net Change in 1996 Mathematics Score Associated with One-Point Change in Variables Listed



The bars in Figure 1 represent the regression coefficients for the three facility measures that are presented in the upper, left-hand cell of Table 7 plus the regression coefficient for the Reading scores that were entered as an independent variable (Table 6). The coefficient for the Reading scores is shown for comparison purposes. A one point (1.00) change in the reading score is associated with a change of .82 in the Mathematics score. Since these are all standardized scores that can range from 0 to 100, one way to think about this coefficient is that the 1996 Reading scores explain about 80 percent of the variability in the 1996 Mathematics scores, when the effects of all other variables entered in the model are held constant.

The facility scores are not nearly as powerful as the Reading scores, but they do explain a significant proportion of the variability in the 1996 Mathematics scores. The Existing Conditions Total variable (ECTOTZ) explains 15 percent, Existing Conditions Adjusted (ECADJZ) 16 percent, and Educational Adequacy Total (EATOTZ) 9 percent of the variability in 1996 Mathematics scores across schools.

The ECADJZ coefficient is negative: as these scores increase, Mathematics scores decrease. This reflects the strong effect of the adjustment made in the Existing Conditions Total score. It will be recalled, that the Construction Control Corporation study adjusted the Existing Conditions Total score by subtracting a specified number of points depending on the age of the building. This adjustment essential made the Existing Condition Adjusted score a measure of the age of the building. Table 2 showed that the actual age of the buildings had a high negative correlation (r = -.88) with the Existing Conditions Adjusted score. As the age of the buildings increased, their Existing Condition Adjusted scores decreased. The adjustment made by Construction Control Corporation caused newer buildings to have higher Existing Condition Adjusted scores.

The negative coefficients for the Existing Conditions Adjusted score in Table 7 indicate that newer buildings, tended to have lower test scores. This is counter to most previous findings. To test its validity, additional regressions were run that deleted the Existing Conditions Adjusted variable and replaced it with the actual age of the buildings. These regressions found age to have significant positive relationships. The Construction Control Corporation report (1991) noted that the age adjustment was made because ". . . MPS facilities have been maintained in a condition which is exceptional for the age of the facility." (p. 5). Perhaps it is this exceptional maintenance that is being reflected in the higher test scores from older buildings.

The percentages of explained variance for the facility measures are not additive. The percentages were suggested as a way of thinking about the meaning of the regression coefficients, but each of the coefficients cannot be converted to a percentage and summed. If this were done for all the variables, the percentage of explained variance would be more than 100.

In 1996 all three of the facility measures had statistically significant relationships with the Mathematics scores. Two other significant coefficients were also found between facility measures and test scores, one each with Science and Social Studies. The coefficients for these five significant relationships ranged from -.16 to .15. For these significant relationships, a 1.00 point change in a facility scores was associated with a -.16 to a .15 point change in the dependent variables. In 1997, there were six significant relationships and the coefficients were about of the same magnitude, a range of -.15 to .13. Only one of these significant 1997 coefficients, however, replicated a relationship found in 1996. The replicated one was for Existing Conditions Total measure and Science scores. The coefficients for these relationships were .14 in 1996 and .13 in 1997.

The limited replication of the 1996 results in 1997 is disappointing, but several significant coefficients still emerged. In 1998, however, none of the relationships between facility measure and test scores were significant. The failure to find any relationships in 1998 caused us to include the results for the free/reduced-price lunch variable in Table 7 as a basis of comparison. This is the student characteristics variable that had the most significant relationships with test data. In 1996 and 1997, seven of the eight relationships between the percentages of students eligible for free or reduced-price lunches and test scores were significant or nearly so. In 1998, however, this variable, just like the facility measures, had no significant relationships with test scores.

It will be recalled that the school scores for 1996 are somewhat different than the scores for 1997 and 1998. In 1996, the scores are the schools' percentile rankings on the national norms for the tests that were administered. In 1997 and 1998, the scores indicate the percentage of students at the schools that scored at the levels defined as proficient or above for their grades. If any year were to have a different pattern of relationships among the variables, one would expect 1996 to be the year. The intercorrelations of the years in Table 3, however, show that 1996 scores correlated much the same with those from 1997 and 1998 as 1997 correlated with 1998. The average correlations of the five tests across the three years were as follows:

1996 with 1997, $r = .72$
1996 with 1998, $r = .63$
1997 with 1998, $r = .69$

Given the internal consistency of the Milwaukee data, we have no explanation for the failure to find significant relationships in 1998. The test data correlate in a similar manner across tests and across years. The 1998 data do not vary significantly from the other years. We could find no anomalies that would suggest why 1998 should yield no significant relationships, but this was true for almost all of the independent variables, not just the facility scores.

Although the facility measures are the major focus of this report, a brief discussion of the other variables in the full model, presented in the Appendix Tables, may be helpful.

- The most powerful independent variable in all of the equations was the Reading score. It was always highly significant, and a change of one point (1.00) in its standardized score was associated with a change of .54 to .90 in the dependent variables.

- In general, the student characteristics variables that had fairly strong one-to one correlations with test data in Table 5 had few significant independent relationships in the regressions. When other factors associated with these student characteristics were held constant, indicators such as attendance, mobility, and suspension rates, had few independent relationship with the relative performance of the schools on the tests. The exception was the free/reduced price lunch variable for which the results were presented in Table 7.

- The percentage of students in different racial/ethnic groups was often significant, especially in 1997. All of these coefficients were positive indicating that as the percentage in each of these groups increased, test scores increased. One of the technical requirements of multiple regression is that the sum of any set of variables cannot be a unity (100 percent). Because of this requirement, American Indians and students classified as Other were not included in the regressions.

- The variables Elementary and Middle School were entered to control for any systematic differences in the merged data sets from the fourth, eighth, and tenth grades. The schools were coded as dummy variables with the high school not entered in the equation because of the restriction on a set of variables adding to a unity. In some of the equations, the percentages scoring at the proficient level or above in the elementary and middle schools were found to differ significantly from these percentages in the high schools. These differences were in both directions, some times higher and sometimes lower.

In summary, out of 36 relationships between facility measures and three years of test scores, 11 were statistically significant in 1996 and 1997. This is far higher than would be expected by chance. At the .05 probability level, only two relationships would be expected to be significant by chance. No significant relationships were found in 1998, and there is no apparent reason why this year should be so different.

DRAFT

Conclusions

A long history of educational research has demonstrated that family background has a strong impact on academic achievement: children from economically disadvantaged families perform more poorly than those from more favorable circumstances (*e.g.* Inoue 1999). Other research has demonstrated that school attachment, as reflected in attendance and suspensions, is essential to achievement (*e.g.*, ERIC Clearinghouse on Urban Education 1997). These are among the most established relationships in educational research.

It is somewhat surprising, therefore, that when differences in the individual ability of students were controlled in this study, measures of school facilities explained as much of the differences in test performance across schools as indicators of family backgrounds and school attachment. Reading scores were used to control for differences in individual ability. These scores together with measures of school facilities, family background, and school attachment were able to explain between 75 and 92 percent of the variability in scores on Mathematics, Language, Science, and Social Studies tests administered in 1996, 1997, and 1998.

Out of 36 estimates of the net, independent relationships of measures of school facilities with performance on the WSAS tests, 11 were found to be significant. The significant relationships for facility measures typically explained about 10 to 15 percent of the differences in scores across schools when the influences of the other variables were statistically controlled. When simple one-to-one correlations were calculated between the facility measures and test scores, there were no significant relationships. Multiple regression was needed to detect relationships that were hidden by the effects of other variables.

Out of 48 similar estimates of the relationship between measures of family background (mobility rates and eligibility for free/reduced lunches) and school attachment (attendance and suspension rates) with test performance, 9 were found to be significant. Those that were significant explained between 8 and 28 percent of the differences in test scores across schools when other variables were controlled.

The evidence, however, is not fully consistent. Relationships that were found for one year of test data were not replicated in other years. Very few significant relationships, except for the Reading test, were found in 1998. Nevertheless, there are many more significant relationships than would be expected by chance, and the analyses of the internal consistency of the data found all the expected relationships. These analyses did not yield any results that would account for the low number of significant relationships in the 1998 data. One possible explanation is that as the time period between the facility measures and test data increases, the chances of finding significant relationships decrease. This may also be the case for the measures of family background and school attachment. If all the measures were from the same school year, a higher proportion of significant relationships might be found.

With the complexity of the learning process and the number of factors that can influence it, it may not be possible to produce a definitive estimate of the effect of facility conditions on student achievement. Overall, the evidence–both previous research and this study–strongly implies such a relationship exists, but it continues to frustrate attempts to chart its dimensions.

APPENDIX

FULL REGRESSION TABLES FOR THE ANALYSES OF THE WISCONSIN STUDENT ASSESSMENT TESTS

DRAFT

Appendix Table A-1. Dependent Variable: Mathematics 96Z

Coefficients

Independent Variables	Unstandardized Beta	Standard. Error	Standardized Beta	t	Probability
(Constant)	-39.946	34.512		-1.157	.124
ECTOTZ	.152	.064	.152	2.389	.009
ECADJZ	-.162	.061	-.162	-2.652	.004
EATOTZ	.093	.049	.093	1.901	.030
SuspensionZ	.005	.072	.005	.076	.450
Attendance96Z	.103	.099	.103	1.040	.150
Mobility96Z	.049	.054	.049	.909	.182
F/R Lunch96Z	-.116	.074	-.116	-1.551	.062
African American	.492	.286	1.283	1.721	.044
Asian	.603	.306	.317	1.961	.025
Hispanic	.603	.289	1.045	2.087	.020
White	.531	.304	.948	1.743	.042
Elementary	-5.890	2.802	-.252	-2.102	.019
Middle School	-5.584	2.336	-.188	-2.391	.009
Reading96Z	.821	.054	.820	15.205	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.908	.825	.805	4.4179

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	11380.545	14	812.896	41.649	.000
Residual	2420.188	124	19.518		
Total	13800.733	138			

Appendix Table A-2. Dependent Variable: Language 96Z

Coefficients

	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-39.140	22.245		-1.760	.040
ECTOTZ	.021	.041	.021	.509	.305
ECADJZ	-.010	.039	-.010	-.266	.396
EATOTZ	.004	.032	.004	.119	.452
SuspensionZ	.012	.047	.012	.266	.395
Attendance96Z	.121	.064	.121	1.894	.061
Mobility96Z	.056	.035	.056	1.595	.056
F/R Lunch96Z	-.083	.048	-.083	-1.736	.042
African American	.395	.184	1.030	2.144	.017
Asian	.424	.196	.223	2.151	.017
Hispanic	.396	.186	.688	2.133	.018
White	.374	.196	.669	1.907	.030
Elementary	-.713	1.806	-.030	-.395	.347
Middle School	-5.674	1.505	-.191	-3.769	.000
Reading96Z	.902	.035	.901	25.920	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.963	.927	.919	2.8475

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	12805.091	14	914.649	112.803	.000
Residual	1005.440	124	8.108		
Total	13810.531	138			

Appendix Table A-3. Dependent Variable: Science 96Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	28.917	38.802		.745	.229
ECTOTZ	.139	.072	.139	1.938	.028
ECADJZ	-.065	.069	-.065	-.946	.173
EATOTZ	.031	.055	.031	.561	.288
SuspensionZ	-.042	.081	-.041	-.516	.304
Attendance96Z	-.045	.112	-.045	-.400	.345
Mobility96Z	.040	.061	.040	.650	.258
F/R Lunch96Z	-.285	.084	-.285	-3.403	.001
African American	.186	.322	.485	.578	.282
Asian	.217	.344	.114	.632	.264
Hispanic	.225	.325	.390	.693	.245
White	.197	.342	.354	.579	.282
Elementary	2.160	3.150	.092	.686	.247
Middle School	-.126	2.626	.004	.048	.481
Reading96Z	.732	.061	.732	12.058	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.882	.778	.753	4.9670

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	10733.485	14	766.678	31.076	.000
Residual	3059.209	124	24.671		
Total	13792.694	138			

Appendix Table A-4. Dependent Variable: Social Studies 96Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	5.703	32.005		.178	.430
ECTOTZ	.073	.059	.073	1.238	.209
ECADJZ	-.075	.057	-.075	-1.324	.094
EATOTZ	.089	.045	.089	1.960	.026
SuspensionZ	.006	.067	.007	.102	.460
Attendance96Z	-.040	.092	-.040	-.430	.334
Mobility96Z	-.001	.050	-.001	-.018	.488
F/R Lunch96Z	-.207	.069	-.207	-2.997	.002
African American	.231	.265	.601	.869	.193
Asian	.254	.284	.133	.894	.186
Hispanic	.296	.268	.512	1.103	.136
White	.250	.282	.447	.886	.189
Elementary	7.105	2.597	.303	2.735	.004
Middle School	4.777	2.166	.161	2.206	.014
Reading96Z	.797	.050	.797	15.951	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.922	.849	.832	4.0969

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	11726.854	14	837.632	49.904	.000
Residual	2081.338	124	16.785		
Total	13808.192	138			

Appendix Table A-5. Dependent Variable: Mathematics 97Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-73.913	35.807		-2.064	.020
ECTOTZ	.075	.066	.075	1.141	.128
ECADJZ	-.080	.063	-.080	-1.269	.104
EATOTZ	.060	.050	.060	1.194	.118
SuspensionZ	-.091	.074	-.090	-1.227	.111
Attendance96Z	-.182	.102	-.183	-1.793	.038
Mobility96Z	-.034	.055	-.034	-.621	.268
F/R Lunch96Z	-.157	.078	-.157	-2.000	.024
African American	1.313	.292	3.427	4.496	.000
Asian	1.494	.314	.786	4.762	.000
Hispanic	1.372	.296	2.378	4.641	.000
White	1.354	.310	2.423	4.368	.000
Elementary	10.544	2.870	.451	3.674	.000
Middle School	7.101	2.404	.240	2.954	.002
Reading97Z	.756	.057	.777	13.359	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.902	.814	.793	4.5430

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	11196.112	14	799.794	38.751	.000
Residual	2559.251	124	20.639		
Total	13756.364	138			

Appendix Table A-6. Dependent Variable: Language 97Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-.723	31.904		-.023	.436
ECTOTZ	.066	.058	.066	1.127	.131
ECADJZ	-.147	.056	-.147	-2.609	.005
EATOTZ	.031	.045	.031	.681	.248
SuspensionZ	-.017	.066	-.017	-.262	.397
Attendance96Z	-.123	.091	-.123	-1.353	.090
Mobility96Z	-.053	.049	-.053	-1.091	.138
F/R Lunch96Z	-.121	.070	-.121	-1.734	.042
African American	.550	.260	1.434	2.115	.018
Asian	.583	.279	.307	2.087	.020
Hispanic	.554	.263	.960	2.105	.019
White	.584	.276	1.044	2.114	.019
Elementary	5.109	2.557	.218	1.997	.024
Middle School	.036	2.142	.001	.017	.488
Reading97Z	.784	.050	.805	15.554	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.923	.853	.836	4.0478

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	11764.431	14	840.317	51.286	.000
Residual	2031.725	124	16.385		
Total	13796.156	138			

Appendix Table A-7. Dependent Variable: Science 97Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-73.470	36.620		-2.006	.024
ECTOTZ	.127	.067	.127	1.897	.030
ECADJZ	-.125	.065	-.125	-1.928	.028
EATOTZ	.133	.052	.133	2.575	.006
SuspensionZ	-.067	.076	-.066	-.890	.188
Attendance96Z	-.090	.104	-.090	-.865	.194
Mobility96Z	-.067	.056	-.067	-1.195	.117
F/R Lunch96Z	-.119	.080	-.119	-1.480	.070
African American	1.183	.299	3.083	3.960	.000
Asian	1.229	.321	.646	3.831	.000
Hispanic	1.258	.302	2.177	4.161	.000
White	1.296	.317	2.318	4.091	.000
Elementary	10.411	2.935	.445	3.547	.001
Middle School	9.231	2.458	.311	3.755	.000
Reading97Z	.661	.058	.678	11.421	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.897	.806	.784	4.6463

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	11118.480	14	794.177	36.788	.000
Residual	2676.888	124	21.588		
Total	13795.369	138			

Appendix Table A-8. Dependent Variable: Social Studies 97Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-61.593	35.961		-1.713	.044
ECTOTZ	.118	.066	.118	1.788	.038
ECADJZ	-.136	.063	-.136	-2.147	.017
EATOTZ	.060	.051	.060	1.177	.121
SuspensionZ	.037	.074	.036	.495	.310
Attendance96Z	.146	.102	.146	1.432	.078
Mobility96Z	-.014	.055	-.014	-.256	.385
F/R Lunch96Z	-.060	.079	-.060	-.759	.224
African American	.818	.293	2.132	2.788	.003
Asian	.885	.315	.465	2.810	.003
Hispanic	.876	.296	1.517	2.952	.002
White	.965	.311	1.742	3.131	.001
Elementary	-9.011	2.882	-.385	-3.126	.001
Middle School	2.089	2.414	.070	.865	.194
Reading97Z	.689	.057	.707	12.125	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.902	.813	.792	4.5626

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	11209.708	14	800.693	38.462	.000
Residual	2581.389	124	20.818		
Total	13791.096	138			

Appendix Table A-9. Dependent Variable: Mathematics 98Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-16.729	28.836		-.580	.282
ECTOTZ	.079	.052	.079	1.517	.066
ECADJZ	.019	.050	.019	.369	.356
EATOTZ	-.044	.040	-.044	-1.082	.140
SuspensionZ	-.018	.060	-.018	-.300	.382
Attendance96Z	-.071	.081	-.071	-.883	.190
Mobility96Z	-.052	.044	-.052	-1.176	.121
F/R Lunch96Z	.077	.061	.077	1.251	.106
African American	.383	.234	.986	1.634	.052
Asian	.493	.252	.259	1.960	.026
Hispanic	.367	.237	.635	1.549	.062
White	.416	.248	.743	1.673	.048
Elementary	10.304	2.298	.440	4.482	.000
Middle School	-.781	1.926	-.026	-.405	.343
Reading98Z	.717	.044	.717	16.311	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.938	.881	.867	3.6443

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	12155.485	14	868.249	65.376	.000
Residual	1646.835	124	13.281		
Total	13802.320	138			

Appendix Table A-10. Dependent Variable: Language 98Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	2.854	24.562		.116	.454
ECTOTZ	.030	.045	.030	.673	.251
ECADJZ	.027	.043	.027	.636	.263
EATOTZ	-.033	.034	-.033	-.965	.168
SuspensionZ	-.004	.051	-.004	-.073	.471
Attendance96Z	.040	.069	.040	.576	.282
Mobility96Z	-.023	.038	-.023	-.610	.272
F/R Lunch96Z	.001	.052	.001	.025	.485
African American	.022	.198	.057	.110	.461
Asian	.034	.214	.018	.160	.436
Hispanic	-.008	.202	-.014	-.039	.484
White	.040	.212	.072	.189	.426
Elementary	1.618	1.958	.069	.826	.205
Middle School	1.855	1.641	.063	1.131	.130
Reading98Z	.896	.037	.897	23.929	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.956	.913	.903	3.1041

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	12538.041	14	895.574	92.944	.000
Residual	1194.821	124	9.636		
Total	13732.863	138			

Appendix Table A-11. Dependent Variable: Science 98Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	26.062	24.196		1.077	.142
ECTOTZ	.019	.044	.019	.443	.329
ECADJZ	.037	.042	.037	.870	.193
EATOTZ	-.009	.034	-.009	-.260	.398
SuspensionZ	-.088	.050	-.086	-1.750	.042
Attendance96Z	-.010	.068	-.010	-.146	.442
Mobility96Z	-.020	.037	-.020	-.526	.299
F/R Lunch96Z	-.000	.051	.000	-.004	.493
African American	.141	.196	.367	.716	.238
Asian	.215	.211	.113	1.016	.156
Hispanic	.136	.198	.236	.685	.248
White	.183	.208	.328	.880	.190
Elementary	14.673	1.929	.627	7.607	.000
Middle School	4.342	1.616	.146	2.686	.004
Reading98Z	.542	.037	.542	14.710	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.957	.916	.906	3.0580

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	12641.433	14	902.959	96.559	.000
Residual	1159.570	124	9.351		
Total	13801.003	138			

Appendix Table A-12. Dependent Variable: Social Studies 98Z

Coefficients

Independent Variables	Unstandardized Beta	Standard Error	Standardized Beta	t	Probability
(Constant)	-11.093	33.331		-.333	.370
ECTOTZ	.045	.061	.045	.738	.231
ECADJZ	-.032	.058	-.032	-.544	.294
EATOTZ	.028	.047	.028	.610	.272
SuspensionZ	.001	.069	.000	.007	.492
Attendance96Z	.043	.093	.043	.457	.324
Mobility96Z	-.057	.051	-.057	-1.110	.134
F/R Lunch96Z	.056	.071	.056	.790	.216
African American	.165	.271	.429	.608	.272
Asian	.292	.291	.153	1.003	.109
Hispanic	.149	.274	.259	.546	.293
White	.233	.287	.416	.811	.220
Elementary	.412	2.657	.018	.155	.438
Middle School	.172	2.226	.006	.077	.470
Reading98Z	.844	.051	.844	16.622	.000

Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
.917	.841	.823	4.2124

ANOVA

	Sum of Squares	df	Mean Square	F	Probability
Regression	11597.251	14	828.447	46.688	.000
Residual	2200.277	124	17.744		
Total	13797.528	138			

REFERENCES

Berner, M. M. (1993). Building conditions, parental involvement, and student achievement in the District of Columbia public school system. **Urban Education**, 28(1), 6-29

Bowers, J. H., and Burkett, C. W. (1989). Effects of physical and school environment on students and faculty. **CEFPI's Educational Facility Planner**. January-February, 28-29.

Coleman, J. S.; Campbell, E. Q.; Hobson, C. J.; McPartland, J.; Mood, A.M.; Weinfeld, F. D.; and York, R. L. (1966). ***Equality of Educational Opportunity***. Washington, DC: U.S. Government Printing Office.

Construction Control Corporation, (1991). **Report of Findings: Existing Conditions Survey and Educational Adequacy Survey for the Milwaukee Public Schools**. Raleigh, NC: Author.

Duke, D. L. (1998). **Does It Matter Where Our Children Learn**? White paper commissioned by the National Research Council of the National Academy of Sciences and the National Academy of Engineering for an invitational meeting February 27, 1998 in Washington, DC. (ERIC ED 418 578)

Earthman, G. I., Cash, C. S., and Berkum, D. V. (1995). **A Statewide Study of Student Achievement and Behavior and School Building Condition**. Paper presented to Annual Meeting, Council of Educational Facility Planners, International, Dallas, TX, September 19.

Earthman, G. I., and Lemasters, L. (1998). **Where Children Learn: A Discussion of How a Facility Affects Learning**. Paper presented at the Annual Meeting of Virginia Educational Facility Planner, Blacksburg, VA, February 23-24, 1998. (ERIC ED 419 368)

ERIC Clearinghouse on Urban Education. (1997). **Urban Policies and Programs to Reduce Truancy**. ERIC/CUE Digest Number 129. New York: Author, Institute for Urban and Minority Education, Teachers College Columbia University. (ERIC ED 415306)

Inoue, Y. (1999). **The Educational and Occupational Attainment Process: The Role of Adolescent Status Aspirations**. Lanham, NY: University Press of America.

Maxwell, L. E. (1999). **School Building Renovation and Student Performance: One District's Experience**. Scottsdale, AZ: Council of Educational Facility Planners, International.

Office of Educational Accountability (1997). **Proficiency Score Standards for the Wisconsin Student Assessment System (WSAS) Knowledge and Concepts Examination for Elementary, Middle, and High School Grades 4, 8, and 10. Final Summary Report.** Madison, WI: Wisconsin Department of Public Instruction. (ERIC ED 418 993)

Schrag, J. A. (1999). **Inputs and Processes in Education: A Background Paper**. Prepared for Project FORUM, Alexandria, VA: National Association of State Directors of Special Education. (ERIC ED 427 453)

Walberg, H. J. (1980). A psychological theory of educational productivity. In F. H. Faley & N. Gordon (Eds.) ***Psychology in Education*** (pp. 81-110). Berkeley: McCutchan.