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ABSTRACT

This study, involving selected Virginia urban high schools, examines the relationship between school facility condition and student achievement and behavior. The study determined student achievement by using the Test of Academic Proficiency for grade eleven during the 1992-93 school year; student behavior was determined by the ratio of the number of expulsions, suspensions, and violence/substance abuse incidents to the numbers of students in each school. The study's findings show that student achievement scores and disciplinary incidents are higher in schools that have better building conditions. Science achievement scores also are higher in schools that have better science laboratory conditions. Finally, the varying of climate control, locker, and graffiti conditions are factors in improving student achievement scores. Appendices contain statistics on student population and demographics, a copy of the survey used to assess a facility's physical status, documents pertaining to the study sample, and research questionnaires. (Contains 44 references.) (GR)

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ED 478 350

BUILDING CONDITION AND STUDENT ACHIEVEMENT AND BEHAVIOR

by

Eric Wayne Hines

Dissertation submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

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DOCTOR OF EDUCATION

in

Educational Administration

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BUILDING CONDITION AND STUDENT ACHIEVEMENT AND BEHAVIOR

by

Eric Wayne Hines

Committee Chairman:
Glen I. Earthman, Educational Administration

(ABSTRACT)

This study examined the relationship between the condition of school facilities, and student achievement and student behavior. Selected high schools in urban areas of Virginia were used in this study. Building condition was determined by the Commonwealth Assessment of Physical Environment which was completed by personnel in the divisions of the eighty-eight schools in the population. Student achievement was determined by the scale scores of the Test of Academic Proficiency for grade eleven during the 1992-1993 school year. Student behavior was determined by the ratio of the number of expulsions, suspensions, and violence/substance abuse incidents to the number of students in each school. All achievement scores were adjusted for socioeconomic status by using the free and reduced lunch numbers for each school. These variables were investigated using analysis or covariance and correlations.

This study found that student achievement scores were higher in schools with better building conditions. Student discipline incidents were also higher in schools with better building condition. Science achievement scores were better in buildings with better science laboratory conditions. Lastly, varying climate control, locker, and grafitti conditions were factors which were positively related to student achievement scale scores.

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DEDICATION

This study is dedicated to my mother, Alma, who instilled a lifelong love of learning in me at a very early age. I only wish that she were here to enjoy this achievement with me. It is also dedicated to my wife, Cheryl, who inspired me to complete this study. Thanks go to my son, Eric Jr. for being proud of me and consistently telling me that he believed in me.

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BUILDING CONDITION

AND STUDENT ACHIEVEMENT AND BEHAVIOR

CHAPTER 1
INTRODUCTION

The physical condition of a school facility often conveys a message to students about the overall concern for their education. If a school building is well maintained, or at least attempts to maintain it are evidenced, then the students may assume that there are expectations of good behavior and high achievement. If the faculty and staff maintain the facility poorly, then students may assume that low demands will be made of them. Messages from parents and peers may or may not reinforce impressions obtained from the school environment. Students can become either positively or negatively affected by what they see.

Studies in other fields, such as the business world, have been conducted which have found that a positive environment is related to improved employee satisfaction and production (Eilers, 1991; Glassman, Burkhart, Grant, and Vallery, 1978). Lexington (1989) stated that production can be directly impacted by such building conditions as climate control, illumination, acoustical measures, and the inner space of the building.

Pearson (1991) advocated fewer students per school, especially in urban areas with social problems. He found that children do better in smaller schools and stated so last year at the Architectural League of New York and the Public Education Association, a private advocacy group. He organized an exhibit of designs for smaller schools based on his findings. Berner (1993), in an analysis of District of Columbia public schools showed that the size of an individual school's Parent-Teacher Association budget is positively related to the school building's condition and to student academic achievement.

Many of the environmental factors that affect workers in the business world exist in school buildings also. One can assume that the student would react to those factors in much the same way as the worker. A positive correlation between physical environment and achievement in middle schools was documented by Chan (1980). Students did indeed react to the condition of the facility in that study. McGuffey and Brown (1987) also identified a relationship between facility condition and achievement.

In her study of rural Virginia schools, Cash (1993) found that higher achievement was associated with schools with air conditioning. She also found that higher achievement was associated with less graffiti, good locker conditions and science equipment, and classroom furniture in good condition. Cash noted further that higher achievement was associated with schools with less noisy external environments. In her study's conclusion, Cash stated that "building condition and student behavior factors were related. The schools with higher quality buildings

reported higher incidents per student population ratios of violence/ substance abuse, suspensions, and expulsions." The suggested cause was that there was possibly more care and surveillance in the higher quality schools than in the substandard schools.

This study addressed selected high schools in urban areas of Virginia. Though studies have been done and books written about problems in urban schools nationwide, no such definitive study documenting possible causal effects of building condition upon student achievement and behavior in this state has been done. Nationally, "Wolves at the Schoolhouse Door," a report by the Educational Writers Association, found that 25 percent of the nation's school buildings are in poor physical condition and not suitable for safe occupancy. This study seeks to not only investigate the physical condition of Virginia's urban high schools, but to explore any relationship to student achievement and behavior. The state of Virginia anticipates funding of $2,226.00 per pupil to address school facility needs according to Earthman and Pantalides (1991). Major renovations are needed in more than half of the school facilities in this state. If research can support a relationship between student achievement on one hand and facility condition on the other, increases in funding on both the state and local level could gain support.

MODEL DESIGN

Those in leadership positions may expect that there is a positive relationship between school building condition and student achievement and behavior, due to the amount of research pointing in that direction. The theoretical model, (Figure 1) used in this research was developed by Cash (1993) to test such a relationship. In this model, student achievement and behavior as affected by the quality of the schools facilities are addressed.

According to Cash, a number of factors could be attributed to the original set of circumstances that affect building condition. The total amount of available money for education, the values that the community placed on education, and other external factors affected the initial quality of a facility. The resources available to maintain facilities and the selection of school personnel in leadership positions can also affect building conditions.

Cash stated further that the school board, the superintendent or any similar educational institution which helps the leadership develop and internalize a personal philosophy of education is responsible for determining the direction local education will move. From that beginning or vision comes a feeling regarding the importance of the physical plant which houses the educational process. If leadership makes the level of importance high, then emphasis will be placed on creating a physical environment which promotes quality education. This emphasis will evidence itself through securing maintenance and custodial staff in adequate numbers and

CASH'S MODEL

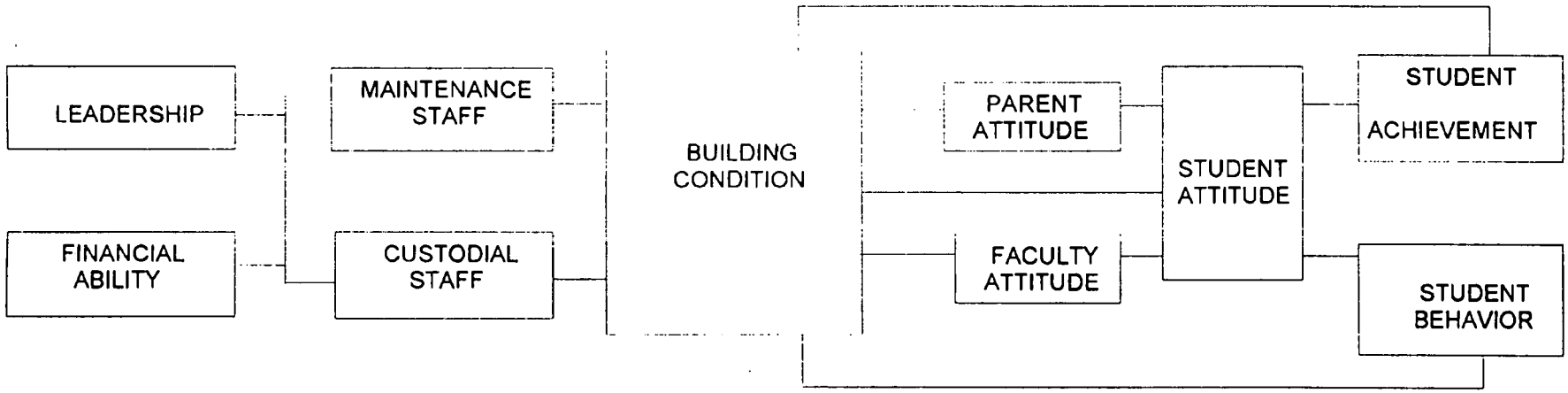

FIGURE 1

providing them necessary training, supervision, and resources to assure their success. The leader communicates to the staff the vision held for the division, and the staff deems that vision important to their performance.

The model also suggests that parental attitude and involvement can affect importance of maintaining school facilities. Edwards (1991) studied the role of parents in the Washington, D.C. School system. She found that some schools had very active PTA's and others participated in an advocacy group called Parents United. Some schools had little or no organized parental environment. She found that the PTA budget was a very significant variable. They influenced the condition of their local schools by applying pressure on local elected officials to push for funding from the city, by directing their own energies to improving the situation such as volunteering to monitor and clean the playground each day, by funding improvement projects directly, and by supporting certain political candidates or educational measures. She found that parents could influence schools to adhere to standards of safety and cleanliness employed in other areas of our lives, but not demanded in many public school buildings. Edwards found further that the resulting condition of buildings could affect the students' perception of their own self worth, the value placed on their education by society, and future prospects for attaining a better standard of living.

Cash found that as the building ages, the condition of the building becomes more and more a product of the performance of the maintenance and custodial staff.

Maintenance left undone multiplies upon itself and results in additional needed maintenance. The same holds true for poor custodial performance, which could contribute to maintenance problems.

The Cash model proposes that building condition affects achievement and student behavior both directly and indirectly. The direct impact on student achievement and behavior might come from illumination, climate control, student population density, acoustics, color, or availability of resources. The indirect impact to both student achievement and student behavior might come through student attitude, as possibly affected by faculty and parent attitudes, or by the students' own feelings about the building condition. The emphasis that the leaders place on education might be conveyed through the buildings' appearance, rightfully or wrongfully so. A positive influence on those who view the building could be the result if good building appearance is seen as the physical expression of how much a community cares.

According to the Cash model, not only might students' attitudes affect both their achievement and behavior; but also their achievement and behavior could affect each other. One then can only guess which comes first; when students behave poorly, they may achieve less, and when they do not achieve, they may misbehave. Additionally, there are other non-facility related variables which could affect this relationship such as levels of discipline, curriculum, or family involvement.

In this study, the theoretical model is applied to selected urban high schools. The achievement and behavior of students in these schools may vary as a result of building condition as well as the result of other variables such as demographics and socioeconomic status.

RESEARCH QUESTION

What is the relationship between the condition of facilities and student achievement and behavior in high schools located in urban areas of Virginia?

PURPOSE

The purpose of this study is to explore the possible relationship between building condition and student achievement and behavior in selected urban high schools in Virginia. If a goal of educational leadership is to improve student achievement and behavior in our schools, then the identification of those physical qualities of the building that impact achievement and behavior is important.

SIGNIFICANCE

Without good schools, none of America's hopes can be fulfilled. Since 1983, school reform has been at the top of the national agenda (Kozol, 1991). However, there is a disturbing gap between rhetoric and results. Even though effective schools research and recent reform reports recommend instructional changes, they mention school building changes as an afterthought. If there truly is such a relationship, and it can be feasibly addressed fiscally, then it could be important for local school boards, as well as state departments of education, to recognize that relationship, for "America 2000" and all of the promises therein remain a very long way from being attained.

The straits are indeed dire in many locations. Kozol (1991) writes that in an East St. Louis high school, the biology lab had no laboratory tables. Students worked at regular desks. The teacher asked for dissecting kits. The few he had were incomplete. Ironically, supplies for the chemistry laboratory, in a city poisoned by two chemical plants, were scarce.

In a New York City school, Kozol stated that textbooks were scarce and children had to share their social studies books. The principal said that there was one full-time pupil counselor and another who was there two days a week. Carpeting was patched and taped together. To make up for the building's lack of windows and the crowded feeling that resulted, the staff put plants and fish tanks in the corridors. He further stated that two first grade classes in this school shared a single room without a window, divided only by a blackboard. Four kindergartens and a sixth grade class of Spanish-speaking children had been packed into a single room in which, again, there was no window. By eleven o'clock the lunchroom was already packed with appetite and life. The kids lined up to get their meals, then ate them in ten minutes. After that, with no place they could go to play, they sat and waited until it was time to line up and go back to class. These conditions can hardly be conducive to the learning process.

One of the reasons why it is important to recognize the relationship between building condition and student achievement and behavior is that Virginia and many other states are constantly confronted with threats of litigation over equity issues. Educational leaders need more information concerning those variables that

contribute to inequities. Virginia's reliance upon localities to provide facilities without state support places it in a position where the results of a study of this nature could become vital information. If facility equity is necessary to acquire educational equity, then capital outlay might become a state function. Current efforts by selected Virginia localities to seek greater equity make this a timely study.

Virginia does not maintain state-wide information regarding the condition of local school facilities. A report of facility condition of urban high schools would give the state a base of information which could then be used in an effort to develop a program for addressing facility needs. This program could be used as a vehicle for state identification of general facility condition.

DEFINITIONS

In this study, the following definitions are proposed:

1. An urban population, according to the Virginia Statistical Abstract (1992), has the following definition.

"All persons living in (a) places of 2,500 or more inhabitants incorporated as cities, villages, boroughs, and towns..., but excluding the populations living in rural portions of extended cities..., (b) census designated places of 2,400 or more inhabitants; and (c) other territory, incorporated or unincorporated, included in urbanized areas. An urbanized area consists of a central city or a central core, together with contiguous closely settled territory, that has a total population of at least 50,000."

This definition was modified for purposes of this study to accept populated areas of 100,00 or more, to allow the study to focus on those schools which are found in more populated areas.

2. An urban school is defined as a school in a more populated area. For this study, the schools selected are located in a central city or a central core of the urbanized area with a population of at least 100;000 people in the metropolitan area. The metropolitan area must also, for this study, have a student enrollment of 25,000 or more.

3. Student achievement is defined by using the scaled score on the Test of Academic Proficiency (TAP) administered to all eleventh grade students in the Commonwealth during the 1992-93 school year for each of the following areas: reading comprehension, mathematics, written expression, sources of information, basic composite, social studies, science, and complete composite. Each was used as a dependent variable.

4. Socioeconomic status (SES) is defined as the ratio of the number of students not on free and reduced lunch to the number of students enrolled in the high school in the 1992-93 school year. This factor was used as a covariate in order to control achievement and behavior variance related to SES.

5. Student behavior is defined by (a) the ratio of suspensions to the number of students enrolled in each high school in the 1992-93 school year, (b) the ratio of the number of expulsions to the number of students enrolled in each high school studied in the 1992-93 school year, and (c) the ratio of the number of incidences of violence and substance abuse in each high school to the number of students enrolled as reported by the school to the Virginia Department of Education in compliance with the Code of Virginia, section 22.1 - 280.1.

6. Facility condition is defined through the use of the Commonwealth Assessment of Physical Environment (CAPE), developed by Cash (1993), which is

an instrument that rates facilities on such factors as climate control, acoustics, illumination, student density, science equipment adequacy, building age, and cosmetic facility condition. The CAPE has been revised for this study in order to better serve urban schools or for clarity based on Cash's recommendations.

LIMITATIONS

1. Virginia is the focus of this study because of its uniqueness in funding and diversity of population. While many other states provide grants or other types of aid to assist areas of fiscal need, Virginia's sole state contribution to local capital needs is low interest loans (Earthman and Pantalides 1991).

2. Objectivity of the responses to the survey instrument may be affected due to the fact that a self-survey was used. Asking local in-school personnel to assess their own facility conditions may reflect personal biases.

3. Many variables could be identified that affect student achievement and behavior, and still other variables could be overlooked. This could result in error variance and a less significant correlation in those variables deemed important.

4. Generality of the results of this study of selected urban high schools is limited. These results cannot be applied to the general population of high schools.

ORGANIZATION OF STUDY

This study has five chapters. Chapter I contains the introduction, the research question, the purpose, the significance, the data needs, the definitions, the limitations, and the organization of the study. Chapter II contains a review of the literature which describes the condition of public school buildings in the United States. Research in this area will be presented which suggests a relationship between facility condition and achievement. A discussion of the literature in that area is included. Relevant studies in the area of business and industry are addressed to support this study. Chapter III contains the research design, including methods of statistical evaluation. Chapter IV contains the analysis of the findings of the study. Chapter V contains a summary of the findings, conclusions, and discussion which can be drawn from the analysis and suggestions for further study.

CHAPTER TWO

REVIEW OF LITERATURE

The underlying theory of this research paper is that building condition does have an effect on achievement and behavior. Finding a direct correlation between the facility and its effect on learning is a difficult task. But this has not stopped many of those involved in the educational process from examining and evaluating that correlation. Lane (1991) stated that school facilities could either enhance or detract from the educational process. A review of the research and literature that explore this relationship shall be presented.

Many studies indicate that students are affected positively or negatively by the visual, acoustical, and thermal characteristics of the classroom environment. During the 1986-87 school year 280 fourth and sixth-grade students housed in two separate school facilities -- the oldest and the newest in a Tennessee county school district were tested to determine if the physical environment of a school was related to student achievement, health, attendance, and behavior (Bowers, Howard, and Burkett, 1987). Statistical methods analyzing scores in reading, listening, language, and arithmetic showed a significant difference with the students in the modern building performing much better than the students in the older school. Darder and Upshur (1992) found in a study of Latino children in Boston schools that children were affected by the poor condition of the school buildings and the lack of books and materials.

This literature review will focus on several building attributes that may affect student achievement and behavior. Those attributes will be grouped under three categories -- environmental, cosmetic, and other -- for the purpose of this study.

ENVIRONMENTAL ATTRIBUTES

Lighting

The relationship of achievement with the presence or absence of fluorescent lighting was looked at by Chan (1980). This study found that the presence or absence of florescent lighting had very little effect on achievement. A prior study (Tinker, 1939) showed improved perception with lower fatigue to be related to illumination intensity. Luskiech and Moss (1940) determined that lighting and its quality related positively to student test scores. Florescent lighting proved better than incandescent lighting in regard to glare reduction and diffused light production according to Sleeman and Rockwell (1981). This related to greater work output. Worker productivity was also shown to be affected by lighting with a positive relationship between greater productivity and better lighting (Lexington, 1989; Ruch and Herschauer, 1974).

Illumination was addressed by Hawkins and Lilley (1992) in the Council of Educational Facility Planners International's (CEPFI) Guide for School Facility Appraisal. In this guide, they stated that there needed to be at least a minimum standard of illumination for successful classroom achievement, even though most of the authorities they consulted differed on the effect of that illumination.

Larson (1965) conducted a study which compared student achievement and behavior in windowless and windowed classrooms. He concluded through anecdotal information that many of the students seemed less restless in windowless schools than in schools with classroom windows. Hawkins and Lilley (1992) acknowledged a difference in achievement potential due to the presence of at least one window in each instructional space.

Acoustics

The effect of elevated train noise on reading ability was studied by Bronzaft and McCarthy (1975). Standardized reading scores in a school in New York City were affected by extreme noise. Insulation against sound was found to be most important in this and other studies. The relationship of aircraft noise to such areas as attention strategies, feelings of personal control, and physiological process relating to health (Cohen, Evans, Krant, and Stokels, 1980) were studied. Children from noisy schools were found to have higher blood pressure, less cognitive task success, and greater feelings of helplessness. Cohen and Weinstein (1981) also investigated non-auditory effects of noise on behavior and health. They found that unusual noise affected the attention span in children attempting complex tasks. It also interfered with task efficiency and lowered performance to the level where errors or accidents could have occurred.

When people were asked for directions, or other assistance, those who lived in noisier environments were less socially adept (Page,1977). They gave information

and assistance less frequently. This reduction in social interaction also occurred in urban noise zones (Sauser, Araiz, and Chambers, 1978). Violent acts, arrests, and truancy were associated more highly with increased noise areas.

A positive correlation was shown between high achievement and carpeted instructional areas in a study by Chan (1980). Hawkins and Lilley (1992) included acoustical treatment of classroom ceilings, walls, and floors as items that affect teaching in their appraisal guides.

Climate Control

Another environmental factor of interest to those who have written in this area is climate control. Chan (1980) found that students in a school with air conditioning had higher achievement scores than those in schools without air conditioning. Further, Nolan (1960) found that achievement dropped with higher temperatures, and the maintenance of an ideal temperature was endorsed by Peccolo (1962). Conduct and achievement were found to be affected by change in temperature by Stuart and Curtis (1964), and a relationship between certain academic skills and temperature was found by Harner (1974). King and Marans (1979), found that as temperature and humidity increased, achievement and task performance decreased, as did attention span. Scagliotta (1980) found a relationship between behavior and atmospheric conditions.

Building Age

McGuffey and Brown (1978) studied the influence of building age on students in Georgia in grades four, eight, and eleven. They found that the age of the building itself, along with many building interior values, such as light, acoustics, color, and temperature, drove down academic achievement as the building age increased.

Density

The effect of building condition was evidenced at a recent event at Truro Central School in Massachusetts. The school received an architectural award, and the entire school population and numerous members of the community turned out for the award presentation. Kozol (1991), wrote that a sixth grader read from an essay he had written focusing on his impression of the school. He wrote,

> "I step through the bright red doors into a new world. After five whole years in a small, run down, shack of a school, we had a new building! A school that is different in an odd way - like it is alive! A school that you could fall in love with. This school is like a dream come true. A small cast-off room to the side of the media center is my favorite place, the reading nook; a place for relaxing, a place to just talk to friends. Small walls make you feel secure, like all favorite places should. This building has it all, from the smallest closet to the giant gym. I can honestly say this is the best school in the whole world!"

According to Abramson (1993), an important factor in achievement is the number of square feet per student. He advocated large media centers, dining halls,

and courtyards that can serve as important meeting places for students and teachers and help establish identities for schools. He found higher achievement in schools with adequate space, and further found that if the functions of those spaces were related to curricular programs the success of the programs were greater.

Vandalism

In a study of vandalism in schools, MacKenzie (1989) found a greater sense of school pride in a building considered aesthetically admirable. Prompt removal of grafitti and repair to vandalized building lowered incidents of vandalism. White and Fallis (1979) noted a relationship between poor maintenance and vandalism. They found that the students interpreted the low maintenance as a message that no one cared about damage to the building.

Cramer (1976) found that there were more major violent incidents in older, poorly maintained buildings than in newer schools. The attitude of the students, in these schools, when surveyed, was significantly lower. Rice (1953) found that student attitude as measured by number of violent incidents improved when the school was freshly painted and otherwise aesthetically enhanced. Edwards (1992) noted that parental involvement and student achievement was positively affected by building condition.

A most important report concerning school facilities was published by the General Accounting Office (GAO) in 1995. Senators Carol Mosely-Braun, Edward M. Kennedy, Paul Simon, and others requested information on the physical condition

of the nation's public elementary and secondary schools. The report estimated that the nation's schools need about $112 billion to repair or upgrade America's multi-billion dollar investment in school facilities to good overall condition.

The report surveyed a nationally representative, stratified random sample of about 10,000 schools and augmented the survey with visits to 10 selected school districts. School officials reported that although most schools meet many key facilities' requirements and environmental conditions for education reform and improvement, most are unprepared for the 21st century. Flexible space, including space for small and large group instruction was found lacking in many school buildings. Also lighting, ventilation, indoor air quality, acoustics, and physical security needed improvement in a large number of schools throughout the nation (Tables 1 and 2). Further, many millions of the nation's students reportedly attend schools that do not meet the functional requirements of key education reforms (Table 3).

This GAO report concluded that in particular, central city and urban schools that serve high percentages of minority and poor students are not maintained or equipped to support learning in the 21st century (Table 4).

TABLE 1

Percent Of Schools Reporting Unsatisfactory Environmental Factors -- Lighting, Heating, Ventilation, Indoor Air Quality -- By State

STATE	LIGHTING	HEATING	VENTILATION	INDOOR AIR QUALITY
Alabama	14.7	22.0	26.1	23.2
Alaska	28.1	38.9	51.9	49.9
Arizona	15.7	19.9	29.5	19.6
Arkansas	7.5	7.9	11.9	10.0
California	31.1	24.7	28.8	21.8
Colorado	21.7	29.3	37.2	24.0
Connecticut	9.3	23.8	35.3	18.5
Delaware	9.1	25.6	30.3	26.4
District of Columbia	40.2	31.0	33.9	31.5
Florida	16.0	17.8	34.6	30.6
Georgia	6.9	11.8	12.4	7.7
Hawaii	7.6	6.0	26.2	20.9
Idaho	13.2	19.8	36.5	25.5
Illinois	14.2	21.0	29.2	18.6
Indiana	22.8	20.7	28.8	21.2
Iowa	9.5	11.1	24.2	17.1
Kansas	21.5	22.3	35.2	24.1
Kentucky	14.6	17.7	25.6	19.2
Louisianna	18.4	17.5	7.2	6.3
Maine	9.6	19.7	28.7	30.1
Maryland	18.0	19.2	28.8	20.5
Massachusetts	19.9	32.8	41.9	30.9
Michigan	12.0	16.7	25.3	15.4
Minnesota	11.9	15.0	35.5	30.1

STATE	LIGHTING	HEATING	VENTILATION	INDOOR AIR QUALITY
Mississippi	8.0	10.9	9.4	8.8
Missouri	4.7	10.1	12.8	8.2
Montana	4.7	9.4	20.8	12.9
Nebraska	7.4	16.9	32.9	21.4
Nevada	15.7	21.0	22.6	20.4
New Hampshire	14.0	24.8	46.8	27.2
New Jersey	11.5	10.5	21.7	8.1
New Mexico	20.9	23.9	32.7	22.7
New York	15.8	20.9	36.5	24.1
North Carolina	17.4	14.0	23.4	17.7
North Dakota	10.7	20.1	28.6	24.0
Ohio	13.9	24.9	33.3	18.6
Oklahoma	16.2	18.7	20.6	16.8
Oregon	25.8	27.4	40.1	27.0
Pennsylvania	11.0	17.1	23.3	12.4
Rhode Island	25.4	25.8	28.9	29.8
South Carolina	7.2	13.0	18.3	18.8
South Dakota	9.5	15.1	25.7	19.9
Tennessee	8.3	17.1	19.2	16.0
Texas	13.0	14.2	16.4	12.3
Utah	14.1	21.9	34.1	20.9
Vermont	10.5	22.7	32.2	25.4
Virginia	14.4	16.6	21.7	19.8
Washington	24.0	30.4	41.9	32.4
West Virginia	23.9	34.1	46.5	31.3
Wisconsin	9.6	13.9	20.5	13.3
Wyoming	5.0	11.2	24.1	15.4

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TABLE 2

Percent Of Schools Reporting Unsatisfactory Environmental Factors -- Acoustics, Flexibility, Physical Security -- By State

STATE	ACOUSTICS	FLEXIBILITY	PHYSICAL SECURITY
Alabama	32.8	47.6	35.7
Alaska	32.4	55.5	27.4
Arizona	26.4	52.6	25.3
Arkansas	17.5	42.4	21.2
California	34.2	70.4	41.2
Colorado	21.9	46.5	13.3
Connecticut	28.4	48.4	22.3
Delaware	19.3	48.6	22.3
District of Columbia	51.8	52.4	37.3
Florida	28.0	56.6	33.9
Georgia	11.9	36.2	16.8
Hawaii	37.7	54.1	39.7
Idaho	35.4	53.8	22.5
Illinois	29.1	55.4	23.6
Indiana	33.0	55.4	18.4
Iowa	28.2	55.3	24.1
Kansas	30.3	56.6	21.9
Kentucky	26.4	50.5	21.0
Louisianna	27.5	53.4	29.6
Maine	42.6	58.4	33.3
Maryland	19.6	23.1	13.4
Massachusetts	41.3	51.2	27.9
Michigan	31.0	47.2	20.2
Minnesota	20.7	55.6	27.5

STATE	ACOUSTICS	FLEXIBILITY	PHYSICAL SECURITY
Mississippi	22.0	41.2	28.2
Missouri	22.5	43.2	14.5
Montana	22.9	50.6	18.0
Nebraska	26.1	46.8	21.3
Nevada	7.6	53.5	13.7
New Hampshire	43.8	68.8	21.6
New Jersey	30.3	60.6	19.8
New Mexico	32.1	60.5	24.1
New York	30.0	64.9	21.2
North Carolina	29.5	59.0	21.8
North Dakota	32.8	41.3	18.1
Ohio	39.6	70.6	23.5
Oklahoma	27.3	48.8	26.6
Oregon	31.8	72.2	28.7
Pennsylvania	16.7	42.0	12.8
Rhode Island	38.6	63.7	34.7
South Carolina	22.7	53.8	24.6
South Dakota	23.6	38.5	11.2
Tennessee	21.5	48.6	27.9
Texas	21.3	43.7	18.3
Utah	17.8	52.2	16.1
Vermont	22.9	47.4	22.8
Virginia	24.0	37.5	20.6
Washington	39.7	64.8	34.6
West Virginia	44.0	68.7	34.4
Wisconsin	19.7	52.5	18.8
Wyoming	17.7	52.6	21.9

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TABLE 3

Schools That Do Not Meet The Functional Requirements

Of Key Education Reforms Well

ACTIVITY	PERCENT OF SCHOOLS	NUMBER OF SCHOOLS	NUMBER OF STUDENTS AFFECTED (in millions)
Instructional Activities			
Laboratory Science	42	32,100	**14.6**
Large-group Instruction	38.2	29,500	**14.3**
Storage of Student Assessment Materials	31.3	24,000	**12.9**
Display Student Assessment Materials	27.6	21,200	**11.1**
Library/Media Center	13.4	10,400	**4.2**
Small-group Instruction	9.5	7,300	**3.7**
Support Activities			
Day Care	77.5	55,900	**29.0**
Before/After School Care	58.8	43,100	**22..4**
Social/Health Care Services	27	20,900	**10.5**
Private Areas For Counseling and Testing	25.7	19,900	**10.1**
Parent Support Activities	23.5	18,200	**9.7**
Teacher Planning	13.1	10,200	**5.1**

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TABLE 4

Percent of Schools Not Meeting Selected Functional Requirements of Education Reform Activities By Community Type

ACTIVITY	CENTRAL CITY	URBAN FRINGE/ LARGE TOWN	RURAL/SMALL TOWN
Small-group Instruction	12.0	9.8	7.6
Large-group Instruction	38.8	34.8	39.8
Store Student Assessment Materials	29.9	32.2	31.5
Display Student Assessment Materials	27.1	26.5	28.5
Parent Support	24.2	23.3	23.1
Social/Health Services	27.1	24.4	28.4
Teacher Planning	14.7	12.8	12.2
Private Areas for Counseling/ Testing	30.4	25.8	22.6
Laboratory Science	48.3	43.7	36.9
Library/Media Center	13.6	13.9	12.8
Day Care	76.4	70.2	82.4
Before/After School Care	54.0	51.1	66.2

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Note: Sampling errors range ± 1.3-3.5 percent.

In a study of District of Columbia schools, Berner (1993) hypothesized that extrinsic factors, such as the socioeconomic environment of a school or the active involvement of parents, can influence the condition of public school buildings, and that building condition in turn affects student achievement. Problems in the District range from toilet stall doors missing in restrooms and numerous broken windows

to non-functioning fire alarm systems and entire buildings recommended for closing. The hypothesis was tested by regression analysis on data gathered by a survey of the schools, and it was supported. Berner found that the PTA can play a very active role in improving the condition of the children's schools. She also suggested that good infrastructure is truly at the base of a quality education. The D.C. public school system needs $150 million to address building deterioration and facilities maintenance needs, just to bring it to what is normally considered usable condition. She found that the students were being affected, and lower achievement was the result.

COSMETIC ATTRIBUTES

Color

Color has long been shown to have an effect on performance, achievement, and behavior. Rice (1953) found that the use of pastel colors inside buildings increased the performance of students. Achievement was found to improve with certain combinations of colors by Ketcham (1964). The condition of the paint also made a difference in student achievement, with the presence of a quality, recent paint job resulting in higher student achievement in a study by Rice (1953). He deduced that even though pastels enhanced achievement more so than plain white paint, some improvement would result if that white paint was fresh.

Aesthetics

The aesthetics of a building can impact student achievement and behavior. How a building looks and is maintained was found to have a direct influence on learning and performance (Hathaway, 1991). How often and how quickly is graffiti removed? Responses to a national opinion poll by Hawkins and Stack (1978) indicated that the public appeared to associate higher student achievement with the quality of the school building.

OTHER ATTRIBUTES

Facility Planning

Educational planners all over the United States spend hours of research and discussion time on the subject of the future of American public education and the impact of that future on the design and construction of schools. They wrestle with the implications of a myriad of technological and social demographic changes occurring almost daily in our rapidly changing society. Will the mainstreaming of special education students continue? Will computer oriented curriculums be the rule? Who will decide the merits of natural versus artificial light in our classrooms? Will day care and preschool programs play a larger or smaller role in schools? What will be the impact and extent of community use of the schools? These are issues that will affect schools being built now and in the future. Future building conditions hinge on what we do now. Environmental scanning becomes ever more crucial as we move toward the future. This means planning a building to more adequately meet the strategic needs of a community.

Leadership

In times of fiscal distress such as these, deferred maintenance becomes the means of choice for many school leaders in order to meet or trim their budgets. The emphasis shifts even more to curricula and salaries. The leadership of each school division determines just how far this deferral goes. The values of a leader who emphasizes maintenance and building condition are obvious through the training and assessment of personnel in those areas. Custodial staffing can be adequate or less than adequate depending on the desire of the principal, superintendent, or school board to meet certain standards of building condition. The vision of those in the decision making positions affect the facility conditions through their appointments, requirements for those that they place in positions of leadership, and the demand for upkeep in training and maintenance techniques. The climate for adequate maintenance literally starts at the top.

Maintenance and Custodial Staff

Schoolhouse in the Red, a report submitted by the American Association of School Administrators (1992), addressed the current school maintenance situation.... "on one hand, administrators today are faced with more old school buildings, which require additional maintenance; and, on the other hand, they have smaller maintenance budgets to provide critical upkeep. The price tag for deferred maintenance has quadrupled in just eight years, from $25 billion to $100 billion. A costly proposition in and of itself; deferred maintenance spawns other costs as it speeds up the deterioration of buildings and the need to replace equipment." All across the country, school systems are either ignoring or minimizing all but the most necessary maintenance. The condition and upkeep of buildings are reflective of the school leadership's commitment. In many cases, there is very little training or education of the people who perform the daily custodial and maintenance duties. The School Facility Status Survey (January 10, 1992), a report prepared by the Commonwealth of Virginia Department of Education, determined that 47% of Virginia facilities have deferred maintenance needs and 71% need major replacement or renovation.

An example of urban neglect presents itself to us in the condition of the New York City Public Schools. The city must spend $24 billion on public schools over the next decade, according to a report from the staff of former Chancellor Joseph A. Fernandez (1993). The report indicated that the work is needed to halt the

deterioration of buildings and to relieve overcrowding, a severe problem that has been made worse by new immigration and unexpected surges in the city's population. Almost half of the city's elementary schools are filled beyond capacity, and seven elementary schools are in such bad shape that they should be demolished. The findings are based on site visits and maintenance reports from the school system's 1,053 school buildings. This situation could be that of many urban school districts if the necessary leadership does not step forward. Edwards (1992), in a study of Washington D.C. schools, found that the attitudes of parents and faculty who are affected by how the building is maintained in turn, affects students' attitudes. Urban schools nationwide exhibit this attitudinal reaction to poor maintenance.

While school populations increase, the number of maintenance employees usually drops (Education Writers Association, 1989). In Wolves At The Schoolhouse Door, the custodial staff in Baltimore, Maryland, was half the total number as was employed in 1927, according to Lantz, the assistant superintendent. This was true in spite of the fact that the number of buildings and land area had actually increased. This ratio of lower staffing to higher physical plant needs most likely results in poor building condition.

CHAPTER III

METHODOLOGY

Population

This study targeted selected urban high schools in the state of Virginia. The selected high schools were defined as schools in metropolitan areas with populations of over 100,000 and student enrollments of over 25,000. These metropolitan areas were obtained by identifying the Metropolitan Statistical Areas (MSA), [Roanoke, Lynchburg, Norfolk- Virginia Beach -Newport News, Richmond-Petersburg, Charlottesville, Danville, Johnson City-Kingsport-Bristol, and the District of Columbia (Virginia portion), (Virginia Statistical Abstract, 1992)] that possess the desired populations. Appendix A specifies the qualifying Metropolitan Statistical areas and their populations. Those Metropolitan Statistical Areas that do not have a student population over 25,000 are also listed. Appendix A also specifies the counties and cities in the four qualifying Metropolitan Statistical Areas with their census populations. Appendix B specifies the eighty-eight secondary schools in each of the cities and counties in the study.

Data Needs

Data needs for this study consisted of information concerning the relationship between facility condition and student achievement and behavior. School officials' perceptions of the condition of the urban physical plant were collected with a survey instrument. Student achievement and behavior were also collected simultaneously with a survey instrument. The data needed fell into four categories: building condition scores, achievement scores, behavior scores, and socioeconomic status scores.

The Commonwealth Assessment of Physical Environment (CAPE), as developed by Cash, was used in her study of the effects of building condition on student achievement and behavior in rural Virginia Schools. In her study, various facility assessment instruments were reviewed and the factors best suited to her study were extracted. These factors were lighting, acoustics, climate control, color, density, science laboratory quality, and aesthetics. The instrument also included space for written responses to questions where more specific information would be helpful. The instrument was then field tested by personnel in the Virginia Beach City Public Schools research department who were experienced in facility assessment. These individuals sent the instrument to certain Virginia Beach Public Schools in an attempt to establish and enhance their reliability. The field test scores on eight Virginia Beach high schools proved consistent with expected outcomes of their quality. Cash then tested for inter-rater reliability by assessing five of the eight high schools herself and obtaining similar ratings. The

assessments resulted in information that could be categorized into building condition levels of substandard, standard, and above standard.

School division personnel received this instrument, which consisted mainly of objective questions concerning the building condition. The data obtained from the CAPE were used to determine a score of substandard, standard, or above standard relating to building comparisons between the schools. The raw scores were divided into quartiles. Substandard schools were determined to be those schools with building condition scores in the bottom quartile. Standard schools are those with building condition scores in the middle two quartiles, and the schools scoring in the upper quartile are designated above standard. As Cash stated in her study, these labels are important to the schools only in relation to each other and do not necessarily imply that certain standards are not being met.

The CAPE is divided into two groups of items (Appendix C), one consisting of items used to provide a structural building condition rating of either one or two. The other group consists of items used to determine a cosmetic building condition rating of one or two. In both groups "one" will indicate a rating in the bottom two quartiles of the school population and a "two" will represent a rating in the upper two quartiles of the school population. Structural issues are often more expensive than cosmetic issues, and by seperating these two, costs of remedial options can be more readily determined and hopefully acted upon.

Some of the questions in the CAPE have been revised as a result of the Cash study in an attempt to make it more applicable to an urban setting or for more

clarity. Question four, which addressed heat quality in terms of the heat being evenly dispersed throughout the room, was changed to ask only if each classroom has individual heat control. Whether the heat is uneven or even in terms of dispersal will not be asked as it was in the Cash study. Question five will simply ask if the instructional area is air conditioned or not. The original question asked about the quality of the air conditioning and the responses seemed to be more opinions than subjective or objective answers in the Cash study. Questions seven and nine, which asked about the existence of a schedule for interior and exterior painting were eliminated. This information did little to enhance the study since the current condition as well as the recency of the painting of interior and exterior surfaces are asked in questions six and seven. The choice of football stadium in question nine will be changed to football field. This represents an area on which football can be played but the area does not have a stadium surrounding the field. Lastly, question eighteen will ask only if the lighting in the instructional areas is incandescent or fluorescent, eliminating the query about whether the lighting is hot or cold.

The Test of Academic Proficiency (TAP) scores were acquired from each school in the study to assess achievement. The eleventh grade test score averages, in scale scores, of the Virginia State Assessment Program for the school year 1992-93 were obtained. Scale scores are standard scores which can be used to compare success on different tests. The mathematics, reading comprehension, written expression, information, basic composite, social studies, science, and

complete composite scores were obtained. The basic composite is an average of scores on the reading comprehension, mathematics, written expression, and using sources of information tests. The complete composite is an average of scores for the social studies and science tests and the four tests which comprise the basic composite.

The Commonwealth Assessment of Physical Environment was modified in an attempt to address other concerns that arose in Cash's study. In item one, a request to use scale scores, as opposed to percentiles, was included. In item three, the original instrument asked for the number of suspensions and expulsions. The number of expulsions was unquestionably the number of students who had been expelled. However, the number of suspensions was seen by the respondents as either the number of students who had been suspended or the total number of days of suspension for all students. This misunderstanding made it difficult to make any across the board comparisons. Modifications to clarify the question's intent were made by asking explicitly for the number of students suspended, both in-school and out of school.

Behavior was determined through questions referencing number of expulsions, suspensions, and acts of violence as reported to the state in the Incidence of Violence report mandated in the code of Virginia Section 22.1-180.1 for 1992-93. The survey instrument also requested information referencing the number of physical assaults, sexual assaults, and homicides. Also the reported incidents of possession of weapons, drugs, alcohol, and tobacco were obtained from each school.

Information was requested from each school concerning the percentage of students with approved applications for free or reduced lunch during the 1992-93 school year. This information was used to determine the socioeconomic status of the school. Requested information included the number of students qualified for free meals, for reduced meals, and the ratio of these students to the total number of students enrolled in the high school in the 1992-93 school year.

Data Gathering

Eighty-eight high schools in Virginia were identified as schools in urban areas (Appendix B). Superintendents in those divisions were asked to participate in the study (Appendix D) in December 1993 and to identify a central office or school contact person. Responses noting willingness or non-willingness to participate were returned on pre-addressed, pre-stamped postcards (Appendix E). Eight school divisions agreed to participate initially, pending approval by their individual research departments of the abstract and a description of the study. Following direct phone calls two more divisions agreed to participate pending study approval. In April of 1994, a letter of thanks and instructions was sent (Appendix F) along with the Commonwealth Assessment of Physical Environment (Appendix G) and the survey for collection of behavior, achievement, and free lunch data (Appendix H). A pre-addressed stamped envelope was sent along with the instruments. By June of 1994, only twenty-three survey instruments had been returned. In July, a letter of reconsideration was sent to those divisions which had not responded, and more phone calls were made. Several divisions stated that

they had not received the survey instruments and thirty-eight more packets were sent. Some of the schools did reconsider and by August 1994, sixty-six of eighty-eight (75%) had returned the survey instruments. All but four divisions have some representation. Those divisions that did not respond were Chesterfield, Roanoke County, Roanoke City, and Alexandria Schools.

Data Analysis

Upon the completion and return of the survey instruments, the data were analyzed using analysis of covariance to compare the adjusted means of achievement scores with the three building assessment ratings. The eight defined achievement means were compared across the building conditions. The composite total achievement means were compared between the two cosmetic building conditions and the two structural building conditions. Science achievement means were also compared to the scores in the Commonwealth Assessment of Physical Environment (CAPE) where applicable.

Behavior rating means in three areas were also compared among the three building conditions using analysis of covariance. Socioeconomic status (SES) was used as a covariate to adjust achievement means and behavior rating means for SES variance. Overall building condition, structural, and cosmetic data were run in two sets, with one set being comprised of schools in only Prince William County, Fairfax, Arlington, Henrico, and Virginia Beach in an effort to determine whether or not those schools perceived by the public as more affluent and with better facilities have different test results.

CHAPTER IV

FINDINGS

The data that came in from the schools was consolidated and analyzed. Building condition ratings were determined, using the methods of Cash in her rural schools study. Student achievement and student behavior were compared across building condition levels using Cash's techniques. Results and methods of this analysis are presented.

School Data Consolidation Sheets

A data sheet was made for each school, whereupon reported information was recorded. This school data consolidation sheet was developed by Cash in her study. Two questions dropped from the Commonwealth Assessment of Physical Environment in this study made a change necessary in this instrument, dropping the reporting fields by two. The school data consolidation sheets (Appendix I) were used to determine scores for structural, cosmetic, and overall building condition, violence, suspensions, and expulsion ratios; and free lunch participant percentages, as in the Cash study.

Building Condition Ratings

The response to each question on the Commonwealth Assessment of Physical Environment (Appendix G) was coded on the school data sheet as a one, two, or three. An a response was coded as one, a b response as a two, and a c response was coded as a three. There were two items with only two responses (a and b) and six items with more than three possible responses. These eight items were coded as follows:

ITEM 1

This item concerned itself with the age of the facility and offered responses of a through g. As in the Cash study, buildings fifty years old or older were coded as one (a and b); buildings at least twenty years old but less than fifty years old were identified as two (c, d, and e); and buildings under twenty years old were coded as three (f and g).

ITEM 4

Item four asked if the majority of classrooms had individual heat control. There were two possible answers, yes or no. The response was coded one if the answer was yes (a) and three if the answer was no (b).

ITEM 5

Item five asked if the instructional area of the facility was air conditioned or not. There were two possible responses to this question. The response was coded one if the answer was yes (a) and three if the answer was no (b).

ITEM 9

Item nine asked for an identification of the facilities adjacent to, or part of, the school complex. For this question there were seven possible facilities listed, in addition to space for any other facilities not on the list. The answer was coded one if it designated two or fewer adjacent facilities; the answer was coded two if it indicated more than two, but fewer than four adjacent facilities; and the response was coded three if there were four or more adjacent facilities indicated.

ITEM 12

This question asked in how many areas of the school were graffiti usually found. The choices named seven different areas around the school and left space for the respondent to list any additional areas. The response was coded one if more than three areas were listed, two if at least one but no more than three were listed, and three if no areas were listed.

ITEM 16

Item 16 asked for information concerning the access to and presence of utilities or equipment in the schools' science laboratories. Four responses were listed and extra space was allotted for any further comment. The response was coded one if fewer than four possibilities were marked, two if all four of the possibilities were marked, and three if all four were marked and other additional equipment or utilities were present.

ITEM 24

Item 24 requested the approximate gross square footage of each facility. The responses were coded one if they indicated fewer than 110 square feet per student, two if they indicated at least 110 square feet per student but fewer than 145 square feet per student, and three if they indicated at least 145 square feet per student.

ITEM 25

This item requested the approximate acreage of the high school site. The response received a code of one if 15 or fewer acres were indicated; two if the response indicated more than 15 acres but fewer than 30 acres; and three if 30 or more acres were indicated.

Average Building Rating

As in the Cash study, the overall building condition for each school was derived from averaging the scores on the Commonwealth Assessment of Physical Environment. The conditions were given a rating of one to three. The eighteen items related to structural condition were averaged separately from the six items relating to cosmetic condition.

The items related to structural condition were items one, two, three, four, five, eight, nine, fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty, twenty-one, twenty-two, twenty-four, and twenty-five as listed in appendix C. The items related to cosmetic condition were numbers six, seven, ten, eleven, twelve, and thirteen as also listed in Appendix C.

This allowed a development of subscores in the structural and cosmetic area also ranging from one to three. These scores were then grouped into two or three categories so that a comparison of achievement and behavior factors between and among them could be accomplished.

Grouping of Building Scores into Categories

As in the Cash study, the building condition scores were used to develop frequency distributions. The building conditions were divided into three groups: substandard, standard, or above standard, for analysis purposes. These overall building scores were further divided into cosmetic and structural conditions. Building conditions ratings were derived from these frequency distributions.

If the overall building condition scores fell at or below 2.28, the building was designated a one (substandard), a two (standard) if the scores were 2.28 or above but below 2.65, and three (above standard) if the scores were 2.65 or above that. The cosmetic scores were designated a one (lower) if they fell below 2.82 and a two (upper) if they fell at or above 2.82. Structural scores were converted to a one (lower) if they were below 2.49, and a two (upper) if they fell at or above 2.49. Table 5 gives the count and range of scores in the various categories. These cutoff scores were chosen because the schools' scores fell naturally around the possible whole number scores of one, two, or three based on the coding of the CAPE.

Table 5

The Range, Count, and Percentage of Scores in Each Category: Building Condition, Cosmetic Condition, and Structural Condition

	RANGE	N	%
Overall Building Condition			
substandard	1.91 - 2.27	8	12.1
standard	2.28 -2.65	36	54.5
above standard	2.66 - 2.95	22	33.4
Cosmetic Condition			
lower	2.17 - 2.82	20	30.3
upper	2.83 - 3.0	46	69.7
Structural Condition			
lower	1.78 - 2.49	33	50.0
upper	2.50 - 2.78	33	50.0

Note. The scores indicated in the range column were derived from responses to items in the Commonwealth Assessment of Physical Environment.

Adjusted Achievement Scale Score Means

A comparison was made of achievement score means among building condition ratings using analysis of covariance to adjust the means. The percent of students who did not qualify for free or reduced lunch was the covariate. As in the Cash study, this factor served to adjust the means for socioeconomic status as it reflected the financial status of the students.

Achievement and Building Condition

As in the Cash study, the adjusted achievement scale score means for the state-wide Test of Academic Proficiency for grade 11 during the 1992-93 school year were compared among the three building condition ratings (Table 6).

A comparison of the scale score means of substandard schools and above standard schools reflected increases in scores on every subtest. The complete composite test increased from 190.65 for the substandard schools to 200.13 for the above standard schools. The sources of information subtest showed very little increase from substandard to standard, but a more pronounced increase from standard to above standard. Reading comprehension, mathematics, and written expression subtests showed increases from substandard to standard to above standard as did the basic composite test. Social studies, science, and the complete composite total all showed increases as the buildings moved from substandard to standard to above standard.0

Table 6

A Comparison of Adjusted Achievement Scale Score Means and Percentile Ranks on the Subtest of the Test of Academic Proficiency for Grade 11 During School Year 1992-93 and Building Condition Ratings

	OVERALL BUILDING CONDITION							
	SUBSTANDARD N=8		STANDARD N=35		ABOVE STANDARD N=22		DIFFERENCES SUBSTANDARD AND ABOVE STANDARD	
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	~~SD~~ PR
Achievement								
Reading Comprehension	185.87	48	193.10	58	196.62	63	10.75	~~12.35~~ 15
Mathematics	182.74	49	188.76	60	192.46	66	9.72	~~9.85~~ 17
Written exp	191.42	58	197.61	65	199.69	67	8.27	~~11.50~~ 9
Sources of Info	194.29	54	194.39	54	205.92	67	11.36	~~14.10~~ 13
Basic Composite	188.66	52	195.70	61	198.42	65	9.76	13
Soc Studies	193.81	54	198.18	62	200.97	65	7.16	~~13.37~~ 11
Science	194.65	57	200.80	66	203.13	66	8.48	~~10.13~~ 9
Complete Composite	190.65	52	197.31	62	200.13	66	9.48	14

Note. Scale score means have been adjusted for socioeconomic status. Percentile ranks have been derived from scale score means which have been adjusted for socioeconomic status. PR denotes percentile rank. SD denotes standard deviation.

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Table 7

A Comparison of Adjusted Achievement Scale Score Means and Percentile Ranks on the Subtests of the Test of Academic Proficiency for Grade 11 During School Year 1992-93 with Cosmetic Building Condition Ratings

	COSMETIC BUILDING CONDITION					
	LOWER BUILDING CONDITION SCORES N=20		UPPER BUILDING CONDITON SCORES N=45		DIFFERENCES SUBSTANDARD AND ABOVE STANDARD	
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR
Achievement						
Reading Comprehension	190.45	54	194.71	59	4.26	5
Mathematics	187.20	58	190.20	62	3.00	4
Written exp	195.02	61	198.68	65	3.66	4
Sources of Info	198.14	58	198.34	58	.20	0
Basic Composite	193.38	58	196.80	63	3.42	5
Soc Studies	196.23	59	199.63	63	3.40	4
Science	198.44	63	201.89	68	3.45	5
Complete Composite	194.89	57	198.58	63	3.69	6

Note. All standard score means have been adjusted for socioeconomic status. All percentile ranks have been derived from standard score means which have been adjusted for socioeconomic status. SD denotes standard deviation. PR denotes percentile rank.

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Table 8

A Comparison of Adjusted Achievement Scale Score Means and Percentile Ranks on the Subtests of the Test of Academic Proficiency for Grade 11 During School Year 1992-93 and Structural Building Condition Ratings

	STRUCTURAL BUILDING CONDITION					
	LOWER BUILDING CONDITION SCORES N=33		UPPER BUILDING CONDITION SCORE N=32		DIFFERENCES SUBSTANDARD AND ABOVE STANDARD	
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	SD
Achievement						
Reading Comprehension	190.60	54	196.29	62	5.69	12.35
Mathematics	186.19	56	192.46	65	6.27	9.85
Written exp	195.23	61	199.95	66	4.72	11.50
Sources	198.88	58	197.66	57	(1.22)	14.10
Basic Composite	193.20	58	198.39	65	5.19	
Soc Studies	196.03	59	201.22	66	5.19	13.37
Science	198.42	63	203.31	70	4.89	10.13
Complete Composite	194.65	57	200.32	66	5.67	

Note. All standard score means have been adjusted for socioeconomic status. The percentile ranks have been derived from standard score means which have been adjusted for socioeconomic status. SD denotes standard deviations. PR denotes percentile rank.

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Achievement and Structural Building Condition

The Commonwealth Assessment of Physical Environment contained items addressing building conditions such as presence of windows, heat, air conditioning, acoustics, type of roofing, science equipment and grounds. The Cash model suggested a direct affect on student achievement and behavior depending on the quality of these conditions. The nationwide GAO study noted earlier suggested the importance of these areas on the education of our children. Thirty-three schools scored in the lower half and thirty-two in the higher half on the CAPE instrument.

Every area of testing on the TAP showed increases between the lower and higher scored schools based on the CAPE, except for sources of information, which went from 198.88 to 197.66 (Table 8). Once again, these scores were adjusted for socioeconomic status. The differences between each group were rather large, suggesting a relationship with improved structural conditions.

Percentile ranks reflected the higher scaled score means of the subtests between the two building types. The only exception was the sources of information subtest. This one test showed a decrease of one percentile rank from lower to higher structural condition. Positive changes of nine percentile ranks occurred in both mathematics and complete composite scores.

Table 6 also provides the scores in percentile rank. The scale scores increased on every subtest from substandard to above standard. The sources of information subtest percentile rank remained the same from substandard to standard, but also showed the largest increase of 13 points from standard to above standard. The percentile rank of the science subtest was the same from standard to above standard.

Achievement and Cosmetic Building Condition

The Commonwealth Assessment of Physical Environment (CAPE) contained six questions that addressed cosmetic conditions. Those conditions consisted of interior and exterior painting, floor maintenance, and graffiti issues. Based on the responses to these six items, the schools were divided into lower or upper scoring categories.

The Test of Academic Proficiency scale score means were adjusted for socioeconomic status and compared for the lower and upper scoring groups as in the Cash study. For every subtest in the TAP, the mean scale scores were higher in the above standard buildings than in the below standard buildings (Table 7). The only exception was the sources of information scores.

Percentile ranks, also displayed in Table 7 were higher for the above standard buildings than the below standard buildings except for the sources of information subtest. An increase of over four points also was evident in the complete composite score. There was over a four point difference in the science and the reading comprehension subtest percentile ranks.

Behavior and Building Condition

As in the Cash study, the behavioral factors of suspensions, expulsions, and violence/substance abuse incidents were documented for the 1992-93 school year and compared to the student population to determine incidents-per-student ratios. These behavior factors were adjusted for socioeconomic status and then compared across building conditions. The incidents-per-student ratios were calculated by dividing the number of incidents by the number of students. For example, a school with a student population of 200 and 50 suspensions would have a .25 incidents-per-student ratio. This would equal 25 incidents per every 100 students. These ratios were compared across the three building conditions; substandard, standard, and above standard (Table 9). The data gathered was for the whole school year of 1992-1993.

Unlike the Cash (1993) study of rural schools, the results of this comparison varied. Her study reflected higher incident ratios of suspension and violence/ substance abuse, and expulsions as building conditions improved. This urban study showed an increase in expulsions from .65 expulsions to .79, to 1.9 per 100 students as building conditions improved from substandard to standard to above standard, which supported her findings. However, suspensions and violence/ substance abuse incidents increased from substandard to standard, and then dropped from standard to above standard. Still in all cases there was an increase in incidents from substandard to above standard buildings across all behaviors. These results seem to still suggest more disciplinary incidents reported in better maintained buildings.

Table 9

A Comparison of Behavior/Student Ratios and Building Condition Ratings

	BUILDING CONDITION		
	SUBSTANDARD N=8	STANDARD N=35	ABOVE STANDARD N=22
Behavior			
Suspensions	.3998	.5346	.4664
Expulsions	.0065	.0079	.0191
Violence/ Substance Abuse	.0365	.0603	.0402

Note. The behavior/student ratios have been adjusted for socioeconomic status. These ratios are per every 100 students.

Cosmetic building condition was compared across the three behavior factors to determine differences (Table 10). The number of expulsions increased from the lower rated to the higher rated buildings. However, suspensions, incidents of violence, and substance abuse did not increase. The model represents these findings as indirect effects on behavior through attitude (Cash, 1993).

The average behavior ratio scores for suspension, expulsion, and violence/ substance abuse were then compared to lower and upper scoring schools in the structural building conditions (Table 11). The ratios showed more disciplinary action as far as expulsions occurred in improved structural buildings. The theoretical model represented this as a direct effect of building condition.

Science Equipment and Science Achievement

As in the Cash study, there were two items in the physical assessment survey directed towards science laboratory equipment availability. The science discipline was addressed because test results could be affected by a tangible physical presence; that being laboratory equipment, as opposed to history or English where laboratories are not required for instruction.

The first question addressing science laboratories, item 16, asked what utilities or equipment was available and in useable condition. The choices were gas, water, electricity, and sinks. As in the Cash study, if all four choices were available and functional, then the science lab was considered standard. If one or more functions were missing or not working, the lab was considered substandard.

Table 10

A Comparison of Behavior/Student Ratios for Schools Grouped by Cosmetic Building Condition Ratings

	COSMETIC BUILDING CONDITION	
	LOWER SCORES N=20	UPPER SCORES N=45
Behavior		
Suspensions	.582	.456
Expulsions	.0060	.014
Violence/ Substance Abuse	.051	.011

Note. The behavior/student ratios have been adjusted for socioeconomic status. These ratios are per every 100 students.

Table 11

A Comparison of Behavior/Student Ratios for Schools Grouped by Structural Building Condition Ratings

	STRUCTURAL BUILDING CONDITION	
	LOWER SCORES N=33	UPPER SCORES N=32
Behavior		
Suspensions	.506	.483
Expulsions	.0077	.015
Violence/ Substance Abuse	.059	.041

Note. The behavior/student ratios have been adjusted for socioeconomic status. These ratios are per every 100 students.

The science achievement adjusted scale score means subtest of the Test of Academic Proficiency were then compared for schools with substandard and standard ratings (Table 12). The schools designated substandard, or lacking at least one function (N=52) had a mean scale score of 199.34 and the schools with all facilities (N=13) had a mean scale score of 206.77. The percentile rank for the standard schools was 73 based on adjusted scale score, and 65 for the substandard (Table 12).

The other science-related item on the Commonwealth Assessment of Physical Environment, item 17, asked how long ago science equipment had been updated to current standards. The choices were: updated over 10 years ago (N=20), updated between 5 and 10 years ago (N=16), and updated less than 5 years ago (N=29). The adjusted scale score means on the Science subtest of the Test of Academic Proficiency went from 201.05 on those schools updated over 10 years ago to 197.80 at those schools updated less than over 10 years ago, but over 5 years ago, to 202.35 at those schools updated less than 5 years ago (Table 13). In spite of a drop in those schools in the middle choice, the percentile rank went up one percentage point from the lowest choice to the highest.

Individual Building Condition Factors And Achievement

Cash's study of rural Virginia schools compared the individual Commonwealth Assessment of Physical Environment responses across the complete composite scale score means on the Test of Academic Proficiency in an effort to assess their individual importance. The results of this comparison in selected urban

Table 12

A Comparison of Science Lab Equipment Availability and Adjusted Science Subtest Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During School Year 1992-93.

(SURVEY ITEM 16: PLEASE INDICATE WHICH UTILITIES OR EQUIPMENT ARE AVAILABLE AND IN USEABLE CONDITION IN THE SCIENCE LABS - GAS, WATER, SINKS, ELECTRICITY)

	LACKING AT LEAST ONE	POSSESSING ALL
	N=52	N=13
Science Achievement		
Scale Score Means	199.34	206.77
Percentile Rank	65	73

Note. Scale score means have been adjusted for socioeconomic status and percentile rank has been derived from scale score means which have been adjusted for socioeconomic status.

Table 13

A Comparison of Science Lab Equipment Age with Adjusted Science Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During the 1992-93 School Year

SURVEY ITEM 17: HOW LONG AGO WAS SCIENCE EQUIPMENT UPDATED TO CURRENT STANDARDS?

	UPDATED OVER 10 YEARS AGO	UPDATED BETWEEN 5 AND 10 YEARS AGO	UPDATED LESS THAN 5 YEARS AGO
	N=20	N=16	N=29
Science Achievement			
Scale Score Means	201.05	197.80	202.35
Percentile Rank	68	63	69

Note. Scale score means have been adjusted for SES and percentile rankings have been derived from scale score means which have been adjusted for SES.

schools are presented in Table 14 by item number, the number in each group, and the adjusted mean scale score. The building conditions are rated substandard, standard, and above standard.

Building Age

There was a score for building age in each group. The Composite Scale Score Means for the substandard group (N=1) was 192.70, for standard (N=31) was 194.77, and for above standard (N=33) the score was 200.10. The scores increased over the conditions with a total increase of over seven points from substandard to above standard.

Windows

The substandard buildings (N=12) on this item had a score of 192.94. Standard schools (N=12) scored 194.43, and above standard schools (N=41) scored 199.65. This seems to suggest an improvement in test scores as the number of windows in instructional areas increased.

Floors

This item asked whether floors were wooden, tile or terrazzo, or carpet. Substandard schools, or schools with wooden floors, were not represented. One could then conclude that none of the urban schools reporting has wooden floors. Standard schools (N=36) reported a mean score of 196.35 and above standard

Table 14

A Comparison of Adjusted Complete Composite Scale Score Means on the Test of Academic Proficiency for Grade 11 During the 1992-93 School Year and Commonwealth Assessment of Physical Environment (CAPE) Responses for Items 1 through 13

Item on CAPE		N	Substandard	N	Standard	N	Above Standard
1	Building Age	1	192.70	31	194.77	33	200.10
2	Windows	12	192.94	12	194.43	41	199.65
3	Floors	0	----	36	196.35	29	198.81
4	Heat	28	196.98	0	----	37	197.22
5	Air Conditioning	10	194.87	0	----	55	197.66
6	Interior Paint	0	----	2	199.62	63	197.38
7	Exterior Paint	2	189.44	13	194.39	50	198.56
8	Roof	5	197.84	24	194.72	36	199.21
9	Adjacent Facility	3	213.84	21	193.89	41	198.07
10	Swept	5	199.12	4	204.17	56	196.82
11	Mopped	6	190.88	5	195.79	54	198.33
12	Graffiti	6	194.96	15	197.18	44	197.88
13	Graffiti Removal	4	192.08	1	193.01	60	197.88

Note. Complete questions can be found in Appendix H.

schools (N=29) scored 198.81. This item also suggests improved scores if carpeting is present.

Heat

This item asked if the majority of classrooms have individual heat control. If the response was yes, the school was rated above standard, and if no, then the school was rated substandard. Substandard schools, (N=37) had test scores of 197.22 and above standard schools (N=28) scored lower at 196.98. These scores are very close and no deduction can be made here.

Air Conditioning

This item asked if the instructional area was air conditioned or not. Ten schools answered no and were rated substandard. The test score was 194.87 for these schools. Above standard schools (N=55) had a mean test score of 197.66 or about 3 points higher. As Cash stated, this supports the findings of the Chan(1980) study regarding the impact of air conditioning on student achievement.

Interior Paint

This item asked when was the last time the interior walls of the school had been painted. If they had last been painted over 15 years ago, the building was rated substandard. If last painted between 8 and 15 years ago, the school was rated standard, and if less than 8 years ago, above standard. Substandard schools (N=0), of course reported no scores. Standard schools (N=2) scored 199.62, and above standard schools

(N=63) scored 197.38. The small number of schools not painted in the last eight years make it impossible to discern a pattern.

Exterior Paint

Item 7 asked when the exterior school walls were last painted. Substandard schools, last painted over 7 years ago (N=2) had test scores of 189.44. Standard schools (N=13) were painted between 4 and 7 years ago and had mean composite scale scores of 194.39, and above standard schools, (N=50) painted with the last 4 years or requiring no exterior painting scored 198.56. Although the scores rise with the conditions, the fact that so many schools rated above standard make any pattern questionable.

Roof

Item eight asked whether the roof of the school was showing water damage or not, and to what degree. Substandard schools (N=5) with signs of deterioration scored 197.84. Standard schools (N=24) with a few water stains scored 194.72, and schools with no visible signs of damage (N=36) scored 199.21. The scoring showed no pattern reflecting test score improvement related to building condition.

Adjacent Facilities

This item asked which facilities were adjacent to or part of the school complex. The

choices were a football field, baseball field, soccer field, tennis courts, a swimming pool, or a softball field. Two or less of these facilities gained a substandard rating (N=3) and had a mean scale score of 213.84. Three or four facilities rated a standard condition (N=21) and had a score of 193.89, and above standard facilities, more than four facilities, scored 198.07. Again, the small number of substandard buildings and their associated high score differ from the almost five point difference between conditions two and three.

Floor Maintenance

Questions ten and eleven asked how often instructional areas were swept and mopped. The great majority were swept and mopped on a daily basis. While the test scores improved across conditions in daily mopped buildings, there was no pattern among buildings swept monthly, weekly, or daily. Five schools indicated that they were swept monthly and six reported that they were mopped annually.

Graffiti

Item 12 listed eight areas in the school where graffiti might be found. Six schools reported graffiti in more than three areas and had an associated mean scale score 194.96. Fifteen schools reported graffiti in between one and three areas and had mean scale scores of 197.18, and forty-four schools reported no graffiti and had mean scale scores of 197.88. This is almost a three point difference in schools that report some graffiti and those that report none.

Item 13 asked how long any graffiti remained before removal. Those schools that

waited until summer maintenance or the next painting schedule, (N=4) reported mean scale scores of 192.08. One school reported waiting less than a month but more than a week and had an associated mean scale score of 193.01. The largest group either removed any graffiti in less than a week if it did appear and had a mean scale score of 197.88. Converse to the Cash study, the scale scores were highest for schools with the most prompt removal history.

Locker Condition

Item 14, (Table 15) asked about the condition of school lockers. The schools with most lockers not functional or not in good repair (N=2) reported mean scale scores of 196.18. Those in schools with at least 3/4 of the lockers functional and in good repair (N=3) had mean scale scores of 192.97, and the schools with over 3/4 of the lockers in good repair reported mean scale scores of 197.71. These scores show improvement as locker conditions improve.

Acoustics

This question asked if the interior ceiling was wooden in the instructional areas (N=1), had plaster or acoustical tiles in at least 3/4 of the instructional areas (N=8), or had acoustical tiles throughout the instructional area (N=56). Condition one had a mean scale score of 203.76, condition two a score of 194.44, and condition three a score of 197.76. There is more than a three point difference between the latter two conditions., and a six point drop from condition one to condition three.

Science Laboratories

Because of the presence in the building of a laboratory related directly to the science discipline, these two items, (16 & 17) were addressed separately as in the Cash study. The findings are examined earlier in this chapter.

Lighting

This item asked simply if the lighting in the instructional area was incandescent (N=6), or fluorescent (N=59). The mean scale score for the first group was 199.25 and for the second, 197.43.

Furniture

This question asked if the classroom furniture was facially scarred or functionally damaged (N=2), basically sound (N=21), or largely sound and facially attractive (N=42). The mean scale scores for the two schools were 211.00, the second group scored 195.22, and the third scored 197.91. Discounting the two schools in the first group, there seems to be some score improvement coinciding with furniture improvement.

Grounds

Item 20 asked if the school grounds had either no landscaping, acceptable landscaping, or attractive, well-maintained landscaping. The mean scale scores were 195.19, for the second condition and 198.95 for the third. No schools reported a total absence of landscaping, and there is over a three point increase in scores from condition

two to condition three.

Wall Color

The question here was whether the walls in the classrooms were painted in dark colors (N=0), white (N=16), or were painted in pastel colors (N=49). Those with white walls reported mean scale scores of 196.36 and those with pastels scored 197.80.

Noise

This item asked if noise was a factor in the classroom environment. The first condition, in which noise was evident and no measures had been taken to reduce it (N=6), had a mean scale score of 206.32. The second condition in which reduction measures had been taken (N=13), scored 196.99, and the third in which noise was no factor (N=46) scored 196.42.

Density

Item 24 determined student density in square feet per student. The gross square footage was obtained and then compared to the individual school population. Condition one had less than 150 square feet per student (N=22) and an associated mean scale score of 193.08. Condition two had between 150 and 200 square feet (N=1) and had a score of 207.23 and condition three had over 200 square feet (N=42), with an associated

score of 199.50

Acreage

Item 25 asked for the approximate acreage of the school site. Condition one was 15 or fewer acres (N=12) and had a mean scale score of 192.84. Condition two reported between 15 and 30 acres (N=7) and scored 191.88, and condition three (N=46) with over 30 acres, had an associated mean scale score of 199.49.

Table 15

A Comparison of Adjusted Complete Composite Scale Score Means on the Test of Academic Proficiency for Grade 11 During the 1992-93 School Year and Commonwealth Assessment of Physical Environment (CAPE) Responses for Items 14 through 25

Item on CAPE		N	Substandard	N	Standard	N	Above Standard
14	Locker Cond.	2	196.18	3	192.97	60	197.71
15	Ceilings	1	203.76	8	194.44	56	197.76
16	Lab Equip.	0	----	52	195.75	13	204.23
17	Lab Age	20	197.64	16	194.18	26	199.12
18	Lighting	6	199.25	0	----	59	197.43
19	Desks	2	211.00	21	195.22	42	197.91
20	Grounds	0	----	26	195.19	39	198.95
21	Wall Color	0	----	16	196.36	49	197.80
22	Noise	6	206.32	13	196.99	46	196.42
23	Opinion	2	199.98	21	197.11	42	197.50
24	Density	22	193.08	1	207.23	42	199.50
25	Acreage	12	192.84	7	191.88	46	199.49

Note. Complete questions can be found in Appendix H.

The Cash study of rural schools did not concern itself with the assertion that some of Virginia's citizens supposedly have that their urban high schools exhibit a rich versus poor dichotomy. To test this supposition, those schools generally perceived by many as more affluent were grouped and their building condition ratings were ascertained using the CAPE. The same was done with those schools perceived by many of our citizens as less affluent (Table 16).

Group one (N=42) consisted of urban schools in Prince William County, Fairfax, Arlington, Henrico, and Virginia Beach. Group two (N=23) were those urban schools in Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, and Richmond. An analysis of covariance with socioeconomic status as a covariate was implemented to rate overall building condition, structural condition, and cosmetic condition exactly as in the general study. Group one's overall building rating was 2.60, its structural ratings was 2.51 and the cosmetic rating was 2.83. Group two had an overall building rating of 2.38, a structural rating of 2.29, and a cosmetic rating of 2.71. As a result of this analysis it may be stated that those schools perceived as more affluent do indeed have better building conditions as determined by the CAPE. Earlier findings in this study show that, without exception, student achievement improves as the quality of building condition moves from substandard to standard to above standard. This perception could be further clarified by grouping schools by per pupil cost and comparing those schools with high per pupil expenditure with those of low per pupil expenditure.

Table 16

A Comparison of Perceived Difference in Affluent and Less Affluent Urban High Schools and Overall Building Condition, Cosmetic Condition, and Structural Condition.

	AFFLUENT	LESS AFFLUENT
	N=42	N=23
Overall Building Condition	2.60	2.38
Cosmetic Condition	2.83	2.71
Structural Condition	2.51	2.29

Note. Scale score means have been adjusted for socioeconomic status.

Responder Comments

As in the Cash study, the Commonwealth Assessment of Physical Environment elicited comments about some things not specifically requested, but with some potential bearing on achievement and behavior. Although not many schools responded with a comment, those that did were positive and seemed to indicate that a better maintained building contributed greatly to overall school climate. Those free responses are presented in Appendix J.

CHAPTER V

SUMMARY OF FINDINGS

Chapter five contains the summary of findings, conclusions, a discussion based on the analysis and suggestions for further study.

Summary

In this study analysis of covariance was used to examine the possible relationship between certain school building conditions and student achievement and behavior in selected high schools in urban areas of Virginia. The Commonwealth Assessment of Physical Environment, as developed by Cash to study small, rural Virginia high schools, was used to determine building condition ratings. The Test of Academic Proficiency for grade eleven during the 1992-93 school year was used to measure student achievement. Mean scale scores from the subtests were analyzed. Additionally, science mean scale scores were compared across the three building rating responses to those questions concerning science laboratory availability.

Socioeconomic status was used as a covariate to adjust achievement scale scores by using free and reduced lunch student qualification statistics. Student behavior was determined by reports of incidents of expulsions, suspensions, and violence/ substance abuse incidents per total student population. This was

converted to a ratio. All achievement scores and behavior ratios were then compared across the substandard, standard, and above standard building conditions. All achievement scores were also compared between the two levels of cosmetic and structural building conditions.

Conclusions

The purpose of this study was to explore whether or not there is a relationship between building condition and student achievement and behavior in selected urban high schools in Virginia. Upon reviewing the analyzed data, that relationship must be acknowledged. Scale scores improved on every subtest of the Test of Academic Proficiency when substandard buildings were compared to above standard buildings as determined by the Commonwealth Assessment of Physical Environment Survey. These improvements ranged from a mean scale score increase of 7.16 points on the social studies subtest to 11.63 points on the sources of information subtest. This overall improvement denotes a very strong relationship and supports the research question.

The conclusions are not as clear in the area of student behavior. Suspensions did increase as the building conditions moved from substandard to standard based on ratings on the CAPE. This holds true for expulsions and reports of violence and substance abuse. All three areas supported Cash's finding that a better maintained building promoted higher diligence in maintaining discipline and demanding more acceptable behavior. However, as mentioned before, the causal

effect dissipates from buildings rated standard to buildings rated above standard when suspensions and incidents of violence and substance abuse are analyzed. This could have been caused by a fear of reporting all incidents on the individual school level for fear of tainting the above standard schools' perception. Or, there could be other explanations such as reaching a plateau in behavioral improvement in urban schools without more attention to socioeconomic conditions. Still there is more reporting of suspensions, expulsions, and incidents of violence and substance abuse overall from buildings rated substandard to buildings rated above standard, thus supporting the hypothesis.

As in the Cash study, when building condition was analyzed separately based on structural and cosmetic conditions, improved cosmetic conditions were associated with increased mean scale scores on every subtest of the Test of Academic Proficiency. Structural building conditions also influenced student achievement in every mean scale score subtest positively except for the sources of information subtest. All other subtests were higher for schools with upper standard structural building ratings than with lower ratings. Those students in schools possessing more fully equipped science laboratories had higher scale score means on the science subtest than students in schools that did not have fully equipped science laboratories. Among the individual building conditions, higher achievement scores were associated with newer buildings, more windows, and carpeting. The presence of air conditioning was associated with higher scores. More recent exterior painting also was associated with higher scores. Schools with

more extracurricular facilities nearby reflected higher achievement. In the schools that were mopped more frequently, the student achievement was higher. Expedient graffiti removal was associated with higher achievement. Higher achievement was associated with better locker conditions, but 60 of the 66 schools were in the above standard category. Better classroom furniture was associated with higher scores. Grounds in better condition were associated with higher scores.

Comparison With Results of Study of Rural High Schools

The scale score results of Cash's study of rural Virginia schools were compared with the scale score results of this study of selected high schools in Virginia's urban areas. Behavioral ratios were also compared between the two studies. Table 17 compares achievement scale scores and percentile ranks on the subtests of academic proficiency in three catagories; substandard, standard, and above standard. Notable is the observation that scale scores and percentile ranks in urban schools are higher than for rural schools whether the schools are substandard, standard, or above standard. For substandard schools, the largest difference was 4.65 points and 7 percentile scores higher for urban schools than rural schools in science. Standard urban schools scored higher than standard rural schools with the largest difference being 8.76 scale scores and 15 percentile ranks higher on the mathematics subtest (see table 17). The sources of information subtest for above standard urban schools was 12.92 scale score points or 15 percentile ranks higher, and the urban mathematics subtest was 11.46 scale points and 19 percentile ranks higher.

Cosmetic building conditions for urban schools were also higher than for rural schools (Table 18). Students in urban schools with high cosmetic ratings scored 15 percentile points higher in the mathematics subtest, the social studies subtest, and complete composite subtests.

Higher scores were observed also when structural building conditions were compared, rural versus urban. For example, urban schools rated high structurally scored 20 percentile ranks and 12.46 scale score points higher than structurally high rated rural schools in mathematics (Table 19). Whether the schools were rural as in the Cash study, or urban, test scores improved as building condition improved.

Table 17

A Comparison of Adjusted Achievement Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During The 1992-93 School Year Between The Cash Study and This Study -- Scores For Overall Building Condition.

RURAL & URBAN

	Scale Scores For Rural Substandard Schools N=10		Scale Scores For Urban Substandard Schools N=8		Differences Center		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD[1]
Achievement							
Reading Comprehension	185	47	185.87	48	.87	1	12.35
Mathematics	179	43	182.74	49	3.74	6	9.85
Written exp	191	57	191.42	58	.42	1	11.50
Sources	189	48	194.29	54	5.29	6	14.10
Basic Composite	186	49	188.66	52	2.66	3	—
Soc Studies	190	48	193.81	54	3.81	6	13.37
Science	190	50	194.65	57	4.65	7	10.13
Complete Composite	187	47	190.65	52	3.65	5	—

PR denotes percentile rank. SD denotes standard deviation.

1 Standard Deviations are from the mean of each Sub Test on The Test of Academic Proficiency. Significant differences between the means of the two studies lie outside the established SD. In this case ~~some~~ none of the differences were significant

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(TABLE 17 CONTINUED)

	Scale Scores For Rural Standard Schools N=21		Scale Scores For Urban Standard Schools N=35		Differences		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD
Achievement							
Reading Comprehension	185	47	193.10	58	8.10	11	12.35
Mathematics	180	45	188.76	60	8.76	15	9.85
Written exp	186	51	197.61	65	11.61	14	11.50
Sources	191	50	194.39	54	3.39	4	14.10
Basic Composite	186	49	195.70	61	9.70	12	—
Soc Studies	190	48	198.18	62	8.18	14	13.37
Science	193	55	200.80	66	7.80	11	10.13
Complete Composite	188	49	197.31	62	9.31	13	—

(TABLE 17 CONTINUED)

	Scale Scores For Rural Above Standard Schools N=10		Scale Scores For Urban Above Standard Schools N=22		Differences		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD
Achievement							
Reading Comprehension	188	51	196.62	63	8.62	12	12.35
Mathematics	181	47	192.46	66	11.46	19	9.85
Written exp	193	59	199.69	67	6.69	8	11.50
Sources	193	52	205.92	67	12.92	15	14.10
Basic Composite	189	53	198.42	65	9.42	12	—
Soc Studies	192	51	200.97	65	8.97	14	13.37
Science	193	55	203.13	66	10.13	11	10.13
Complete Composite	190	52	200.13	66	10.13	14	—

Table 18

A Comparison of Adjusted Achievement Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During The 1992-93 School Year Between The Cash Study and This Study -- Scores For Cosmetic Building Condition.

RURAL & URBAN

	Scale Scores For Rural Lower Rated Schools N=20		Scale Scores For Urban Lower Rated Schools N=20		Differences		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD 1
Achievement							
Reading Comprehension	185	47	190.45	54	5.45	7	12.35
Mathematics	179	43	187.20	58	8.20	15	9.85
Written exp	188	54	195.02	61	7.02	7	11.50
Sources	190	49	198.14	58	8.14	9	14.10
Basic Composite	186	49	193.38	58	7.38	9	—
Soc Studies	191	50	196.23	59	5.23	9	13.37
Science	191	52	198.44	63	7.44	11	10.13
Complete Composite	187	47	194.89	57	7.89	10	—

SD denotes standard deviation. PR denotes percentile rank.

1 = explanation same as # 17.

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(TABLE 18 CONTINUED)

	Scale Scores For Rural High Rated Schools N=21		Scale Scores For Urban High Rated Schools N=45		Differences		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD
Achievement							
Reading Comprehension	187	50	194.71	59	7.71	9	12.35
Mathematics	181	47	190.20	62	9.20	15	9.85
Written exp	190	56	198.68	65	8.68	9	11.50
Sources	192	51	198.34	58	6.34	7	14.10
Basic Composite	187	50	196.80	63	9.80	13	—
Soc Studies	190	48	199.63	63	9.63	15	13.37
Science	193	55	201.89	68	8.89	13	10.13
Complete Composite	189	50	198.58	63	9.58	15	—

Table 19

A Comparison of Adjusted Achievement Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During The 1992-93 School Year Between The Cash Study and This Study -- Scores For Structural Building Condition.

	RURAL & URBAN						
	Scale Scores For Rural Lower Rated Schools N=24		Scale Scores For Urban Lower Rated Schools N=33		Differences		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD 1
Achievement							
Reading Comprehension	186	49	190.60	54	4.60	5	12.35
Mathematics	180	45	186.19	56	6.19	11	9.85
Written exp	189	55	195.23	61	6.23	6	11.50
Sources	191	50	198.88	58	7.88	8	14.10
Basic Composite	187	50	193.20	58	6.20	8	—
Soc Studies	191	50	196.03	59	5.03	9	13.37
Science	193	55	198.42	63	5.42	8	10.13
Complete Composite	189	50	194.65	57	5.65	7	—

SD denotes standard deviation. PR denotes percentile rank.

1 explanation same as # 17

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(TABLE 19 CONTINUED)

	Scale Scores For Rural High Rated Schools N=17		Scale Scores For Urban High Rated Schools N=32		Differences		
	$\bar{X}$	PR	$\bar{X}$	PR	$\bar{X}$	PR	SD
Achievement							
Reading Comprehension	185	47	196.29	62	11.29	15	12.35
Mathematics	180	45	192.46	65	12.46	20	9.85
Written exp	190	56	199.95	66	9.95	10	11.50
Sources	191	50	197.66	57	6.66	7	14.10
Basic Composite	186	49	198.39	65	12.39	16	—
Soc Studies	190	48	201.22	66	11.22	18	13.37
Science	192	53	203.31	70	11.31	17	10.13
Complete Composite	188	49	200.32	66	12.32	17	—

Suspensions, expulsions, and reports of violence and substance abuse increased from substandard schools to above standard schools, both urban and rural (Table 20). The rural schools in Cash's study dropped in reporting expulsions from substandard schools (.004) to standard (.002), but the reports then increased from standard to above standard (.005).

Cosmetic building condition (Table 21) and structural building condition (Table 22) also show reports of behavior/student ratios increasing from lower rated building to higher, whether rural or urban, with suspension dropping for lower rated urban schools (.582) to higher rated urban schools (.456). Violence and substance abuse in Table 21 also shows reports dropping from .051 for lower rated urban schools to .011 for higher rated urban schools based on cosmetic building condition. Both rural and urban schools show decreases in suspensions when compared for structural building conditions. Urban schools rated lower structurally reported more incidents of violence (.059) than urban schools rated higher (.041) as reported in Table 22.

Scale scores in Cash's study of rural high schools did not exhibit increases from substandard to standard to above standard as large as the scale score increases in the selected urban high schools. Urban standard schools scored significantly higher than the urban substandard schools. Above standard urban schools scored still higher than urban standard schools. The total percentile rank change on all subtests was 34 points between rural and urban substandard schools, 94 points between rural and urban standard schools, and 105 points between rural and urban above standard schools on the Test of Academic Proficiency.

An important aspect of this comparison however, is the fact that in all subtests and

in all building conditions, the two studies were exactly alike in the direction of their findings, and this study supports the Cash study.

Table 20

A Comparison of Behavior/Student Ratios and Building Condition Ratings Between The Cash Study and This Study -- Scores For Overall Building Condition.

	Rural Substandard N=10	Urban Substandard N=8	Difference
BEHAVIOR:			
Suspensions	.339	.399	.06
Expulsions	.004	.0065	.0025
Violence/Substance Abuse	.057	.0365	-.020

	Rural Standard N=20	Urban Standard N=35	Difference
BEHAVIOR:			
Suspensions	.746	.534	-.212
Expulsions	.002	.0079	.006
Violence/Substance Abuse	.092	.060	-.032

	Rural Above Standard N=10	Urban Above Standard N=22	Difference
BEHAVIOR:			
Suspensions	.760	.466	-.294
Expulsions	.005	.0195	.014
Violence/Substance Abuse	.111	.040	-.071

Table 21

A Comparison of Behavior/Student Ratios and Building Condition Ratings Between The Cash Study and This Study -- Scores For Cosmetic Building Condition.

	Building Condition Rural Lower N=19	Building Condition Urban Lower N=20	Difference
BEHAVIOR:			
Suspensions	.551	.582	-.031
Expulsions	.003	.0060	.003
Violence/Substance Abuse	.061	.051	-.010

	Building Condition Rural Upper N=21	Building Condition Urban Upper N=45	Difference
BEHAVIOR:			
Suspensions	.736	.456	-.28
Expulsions	.004	.014	.01
Violence/Substance Abuse	.113	.011	-.102

Table 22

A Comparison of Behavior/Student Ratios and Building Condition Ratings Between The Cash Study and This Study -- Scores For Structural Building Condition.

	Building Condition Rural Lower N=23	Building Condition Urban Lower N=33	Difference
BEHAVIOR:			
Suspensions	.653	.506	-.147
Expulsions	.003	.0077	.0047
Violence/Substance Abuse	.072	.059	-.013

	Building Condition Rural Upper N=17	Building Condition Urban Upper N=32	Difference
BEHAVIOR:			
Suspensions	.641	.483	-.158
Expulsions	.004	.015	.011
Violence/Substance Abuse	.110	.041	-.069

Discussion

The purpose of this study was to explore the relationship between building condition and student achievement and behavior in selected urban high schools in Virginia. As Cash stated in her study of rural schools, 60% of student achievement test score variance is explained by many variables, with the majority being that of socioeconomic status. If that factor is removed, and some other variable is found to have significant influence on achievement, then that variable is worthy of further investigation. Kozol (1991) made a most meaningful plea for attention in the area of building condition inequalities. There can be no doubt that the students that he mentioned who were involved in activities that took them from one school to another noticed differences. A football player from a better maintained building, upon traveling to a more poorly maintained building could have possibly noticed the difference. The "savagery", as Kozol terms it, comes with the opposite trip; when a child travels from a school building with one working bathroom or an auditorium with the ceiling caved in to a brand new building with a computer in every room. A law was passed, Kozol relates to us, in California, in which the funding for all schools was required to be the same, no matter where in the state the school was located, lowering funds for all schools. Less than five years after the passing of that law, the parent teacher associations of the schools in the more affluent areas had funded their schools so much more that the old status quo had returned. Accordingly, their schools were cleaner, better equipped with computers, and better maintained physically.

Kozol only asks for better treatment of poor urban students in his book; he pleads for a level playing field. These inequalities can be quite savage when score differences

of up to seventeen percentile ranks in reading comprehension result.

Justice Thurgood Marshall stated it most succinctly in Brown v. Board of Education when he said that it is "an inescapable fact that if one school has more funds available per pupil than another school, it will have greater choice in what it offers to its children." He further noted that if financing variations are so insignificant to quality, then it is difficult to understand why a number of our country's wealthiest school districts pursue the support of those variations.

Without exception, as overall building condition improved, the achievement scores improved. Whether the factors were structural or cosmetic, the student scores improved except for sources of information under structual comparisons. Building conditions that reflected no large monetary expenditure, such as regular sweeping and mopping were accompanied by improved student scores as were more expensive building condition improvements, such as air conditioning, presence of facilities, and available science equipment.

All of Virginia's schools are experiencing financial difficulties, some much more than others. But improvements in building condition that can be acted upon with less financial impact need to be made. Painting, sweeping, and mopping need to be systematized. The school climate needs to be addressed through expedient removal of graffiti and the prompt removal of trash and garbage. The results in this study suggest improvements in student behavior as building conditions improve. A certain level of pride accompanies a better maintained building. The perception of caring parents, faculty, and administrators is an important one. Edwards' 1992 study of Washington, DC schools also stressed parental

and community involvement. She stated that parental and community involvement can affect the condition of school buildings, and that in turn, the condition of buildings can affect students' academic achievement.

There seems to be very little doubt that the environment in which a child studies affects his or her achievement and behavior. When educational reform is the subject, almost universally the need for improved facilities is mentioned. Although this need is widely acknowledged, funding for routine maintenance and capital expenditures for building improvement are the first areas considered for budget cuts.

In this age of political correctness, one is derided if he or she suggests that money matters. The fear of making children in inner city or urban schools feel like victims is a great concern. That is not the goal of this study. The simple introduction of factual statistics, however, should not be discouraged. We, as educators, can fool each other as adults, but the children are watching. They know that they are being treated unequally, and they are responding accordingly. This need not be. It is up to schools to make a difference.

Study Concerns

As in the Cash study of rural schools, certain concerns must be addressed in this study of urban schools. The reliability of those reporting the building conditions must always be a concern.

School pride often clouds certain opinions of what the building looks like. Objectivity needs to be injected into school review. For example, in Portsmouth, Virginia,

the community resisted the tearing down of I. C. Norcom High School. This school had champions in the African American community due to its historical status as being the only school to accept black students before integration. No matter how dismal the condition of the old building became, year after year, razing the building was vigorously resisted. This situation was ameliorated when funding was found to build a new school with the same name in a different location. With confidence in those determined as leaders, school pride can be directed positively and constructively.

The concern of equal funding between districts also exists. The badly maintained building in an affluent district could be considered palatial in a poorer district. This discrepancy could be improved by fairer funding schemes, community involvement, and improved trust in those holding the purse strings.

Virginia's educators are professionals. The evaluations of their buildings ring of the truth in spite of the concerns mentioned. Cash tested the Commonwealth Assessment of Physical Environment survey in Virginia Beach, Virginia, and obtained the same results as evaluators at the school sites. This study supports the administrators involved in the survey and has confidence in the reporting because of the consistency of the reports. The schools located in areas with greater funding abilities reported better maintained schools. This consistency likewise occurred in those areas less able to adequately fund and maintain their buildings.

Certain school districts, Chesterfield, Roanoke City, Roanoke County, and Alexandria did not respond to the study. For that reason, the separate groupings of schools perceived as affluent and those as not affluent were analyzed for building

condition rating. It is suggested here that Chesterfield and Roanoke City schools would score similarly to the other schools perceived as less affluent, and Roanoke County and Alexandria schools would perform as those schools seen as more affluent. Size, ethnicity, or the local composite index of the non-responding group of school districts did not vary from the group of responding school districts.

Recommendations For Further Study

1. Perform a study investigating the staffing levels of school maintenance personnel, their numbers on staff, and how well they handle their work loads. Does the number or workers increase with additional buildings and the aging of buildings? Or is the added work load given to the same number or a lesser number of workers. It is often stated that the operations budget is always cut first. What is the impact when that happens?

2. Look at schools that are contracting maintenance and custodial functions to outside firms. Is there any change in building maintenance and cleanliness? Is there any change in student achievement and behavior?

3. Do an in-depth comparison of students' attitudes at schools with good building conditions on one hand and students' attitudes at schools with poor building conditions on the other. Are there attitudinal differences?

4. Survey school superintendents, seeking their attitudes and concerns in regard to operations' functions and budgets. Do they feel that there is a relationship between the facility's status and student achievement and behavior?

5. In order to increase reliability, perform the same study as done here, but have all surveys and data gathering performed by one person or group of persons. Will this change the data gathered?

6. Survey faculty attitudes in the schools in an effort to determine similarity to student attitudes.

7. Survey the communities in an attempt to determine how they feel the condition of their schools affect student achievement and behavior.

8. Survey communities to determine if there is any relationship between local composite index, building condition, and student achievement and behavior.

9. Investigate further the possibility of a relationship between disciplinary incidents and building condition. What other variables could be involved?

10. Survey teachers' and students' perceptions of building condition. Is there consistency with studies of administrative perceptions?

11. Perform a study looking at a larger population.

12. Perform a study grouping schools by per pupil cost comparing high expenditure with low expenditure schools.

13. Survey teachers for their ideas of discipline in their schools. Is the discipline effective? Does the condition of the building affect disciplinary procedures?

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APPENDIX A

Metropolitan Statistical Areas With Student Population of Over 25,000

Location	Student Population	Less Than 25,000
D.C. (Va Portion)	229,372	Charlottesville
Norfolk	237,185	Lynchburg
Richmond	142,491	Danville
Roanoke	33,564	Johnson City
		Kingsport, Bristol

Counties and Cities With Total Population of Over 100,000

Arlington - 170,936

Fairfax County - 818,584

Prince William County - 215,686

Alexandria City - 111,183

Chesapeake - 151,976

Hampton - 133,793

Newport News - 170,045

Norfolk - 261,229

Portsmouth - 103,907

Virginia Beach - 393,069

Chesterfield County - 209,274

Henrico - 217,881

Richmond - 203,056

*Roanoke County 79,332

*Roanoke City - 96,397

* Roanoke County and Roanoke City schools were included because the total population was very near 100,000.

Student enrollment figures for the Metropolitan Statistical Areas were obtained from the Virginia Statistical Analysis Page 148, table 5.3. Total population figures for the cities and counties were also obtained from the Virginia Statistical Analysis, Pages 535 to 541, tables 16.12A and 16.12B. Individual school demographic breakdowns were obtained from the Fall Membership 1992-1993 report issued by the Virginia Department of Education.

Appendix B: Population and Demographics of Schools In Study

School Number	Name	White	Black	Hispanic	Other	Total	Location
007-0450	Wakefield	385	371	577	265	1598	Arlington
007-0080	Washington and Lee	477	208	569	151	1405	Arlington
029-0660	Annandale	1059	221	271	531	2082	Fairfax
029-0200	Centerville	1278	162	78	183	1701	Fairfax
029-0131	Chantilly	1674	111	76	247	2108	Fairfax
029-1270	Edison	702	186	120	132	1140	Fairfax
029-0020	Fairfax	1057	112	116	211	1496	Fairfax
029-1100	Falls Church	580	121	244	583	1287	Fairfax
029-0032	Herndon	1482	181	152	204	2019	Fairfax
029-1371	Jefferson Sci./Tech	1156	65	61	356	1638	Fairfax
029-1460	Langley	1000	9	25	226	1260	Fairfax
029-1020	Lee	988	168	119	356	1631	Fairfax
029-1060	Madison	1247	55	69	157	1528	Fairfax
029-1290	Marshall	713	97	156	184	1150	Fairfax
029-0790	McLean	953	66	101	219	1339	Fairfax
029-0420	Mt. Vernon	732	429	183	170	1514	Fairfax
029-1710	Oakton	1589	82	93	191	1955	Fairfax
029-1990	South Lakes	1216	313	161	151	1841	Fairfax
029-1070	Stuart	388	123	411	352	1274	Fairfax
029-0900	West Potomac	847	312	107	129	1395	Fairfax
029-1610	West Springfield	1722	87	95	253	2157	Fairfax
029-1260	Woodson	1272	40	60	272	1644	Fairfax

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Schools In Study Population

School Number	Name	White	Black	Hispanic	Other	Total	Location
075-0710	C.D. Hylton	1561	275	65	99	2000	Prince William
075-0690	Gar-Field	1604	618	136	128	2486	Prince William
075-0080	Osbourn Park	1213	68	15	38	1334	Prince William
075-0140	Potomac	915	337	87	78	1417	Prince William
075-0680	Stonewall Jackson	1256	210	83	60	1609	Prince William
075-0060	Woodbridge	2068	449	192	157	2866	Prince William
101-0210	T.C. Williams	618	922	339	169	2048	Alexandria
136-0100	Deep Creek	852	640	9	19	1520	Chesapeake
136-0120	Great Bridge	1634	227	10	22	1893	Chesapeake
136-0830	Indian River	849	743	4	46	1642	Chesapeake
136-0080	Oscar Smith	584	594	2	21	1201	Chesapeake
136-0840	Western Branch	1161	377	7	34	1579	Chesapeake
112-0430	Bethel	783	774	25	44	1626	Hampton
112-0280	Hampton	545	911	12	35	1503	Hampton
112-0320	Kecoughtan	940	647	30	33	1650	Hampton
112-0050	Phoebus	477	683	18	51	1229	Hampton
117-0280	Denbigh	1182	790	128	123	2223	Newport News
117-1190	Fergusen	675	663	17	30	1385	Newport News
117-1220	Menchville	1018	871	69	100	2058	Newport News

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Schools In Study Population							
School Number	Name	White	Black	Hispanic	Other	Total	Location
117-1070	Warwick	788	1067	22	32	1909	Newport News
118-0880	B.T. Washington	224	1096	4	48	1372	Norfolk
118-0390	Granby	686	858	34	68	1646	Norfolk
118-0840	Lake Taylor	517	865	17	62	1461	Norfolk
118-0010	Maury	722	882	14	65	1683	Norfolk
118-0580	Norview	541	1065	18	49	1673	Norfolk
121-0500	Churchland	686	514	2	20	1222	Portsmouth
121-0240	Norcom	61	899	2	1	953	Portsmouth
121-0310	Manor	608	649	1	15	1273	Portsmouth
121-1660	Wilson	281	1125	10	11	1427	Portsmouth
128-0530	Bayside	1177	579	46	68	1870	Virginia Beach
128-0610	First Colonial	1440	226	39	42	1747	Virginia Beach
128-0440	Kellam	1600	259	31	78	1968	Virginia Beach
128-0030	Cox	1603	136	39	53	1831	Virginia Beach
128-0010	Green Run	1373	632	52	243	2300	Virginia Beach
128-0620	Kempsville	1397	121	17	106	1641	Virginia Beach
128-0321	Princess Anne	1266	403	41	74	1784	Virginia Beach
128-0850	Salem	1435	441	39	351	2266	Virginia Beach
128-0920	Tallwood	1058	403	23	266	1750	Virginia Beach

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Schools In Study Population							
School Number	Name	White	Black	Hispanic	Other	Total	Location
021-0740	Clover Hill	1506	260	20	66	1852	Chesterfield
021-0010	Lloyd C. Byrd	1560	105	8	32	1705	Chesterfield
021-0632	Manchester	1389	352	5	48	1794	Chesterfield
021-0530	Matoaca	375	343	2	1	721	Chesterfield
021-0580	Meadowbrook	818	427	26	72	1343	Chesterfield
021-0320	Midlothian	1870	112	7	61	2050	Chesterfield
021-0280	Monacan	1525	223	14	62	1824	Chesterfield
021-0610	Thomas Dale	1148	201	11	30	1390	Chesterfield
043-0410	Douglas Freeman	1156	92	19	101	1368	Henrico
043-0140	Godwin	1399	53	13	67	1532	Henrico
043-0610	Henrico	271	811	1	17	1100	Henrico
043-0670	Hermitage	1005	413	5	47	1470	Henrico
043-0190	Highland Springs	501	634	2	9	1146	Henrico
043-0600	J.R. Tucker	917	157	6	114	1194	Henrico
043-0580	Varina	938	385	2	11	1336	Henrico
123-0621	Franklin Military	6	146	1	0	153	Richmond
123-0741	George Wythe	57	873	3	3	936	Richmond
123-1510	Huguenot	136	994	5	24	1159	Richmond
123-0850	J.F. Kennedy	19	850	3	1	873	Richmond
123-0730	John Marshall	10	903	2	0	915	Richmond
123-0090	Open High	111	34	1	2	148	Richmond
123-0452	Richmond Community	52	121	5	5	183	Richmond
123-0020	J. Ctr/INT'L Govt.	105	472	3	4	584	Richmond

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Schools In Study Population							
School Number	Name	White	Black	Hispanic	Other	Total	Location
080-0470	Cave Spring	1106	26	5	27	1164	Roanoke County
080-0520	Northside	744	53	1	13	811	Roanoke County
080-0630	William Byrd	960	33	2	13	1008	Roanoke County
124-0390	Patrick Henry	1112	461	0	37	1610	Roanoke City
124-0400	William Fleming	670	861	6	44	1581	Roanoke City

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APPENDIX C

Structural Building Items As Measured By CAPE

1. Building Age
2. Windows
3. Flooring
4. Heating
5. Air Conditioning
8. Roof Leaks
9. Adjacent Facilities
14. Locker Condition
15. Ceiling Covering
16. Science Lab Equipment
17. Science Lab Age
18. Lighting
19. Classroom Furniture
20. Grounds
21. Wall Color
22. Exterior Noise
24. Student Density
25. Site Acreage

Cosmetic Building Items As Measured By CAPE

6. Interior Wall Paint

7. Exterior Wall Paint

10. Floors Swept

11. Floors Mopped

12. Graffiti

13. Graffiti Removal

APPENDIX D

4728 Longmont Road

Virginia Beach, VA 23456

December 14, 1993

1 -

2 -

3 -

Dear 1 -

I am a doctoral student at Virginia Polytechnic Institute and State University, and am involved in research in the field of education. This research is designed to discern any relationships between school facility condition and student behavior and achievement in Virginia's urban schools.

In these days of inadequate financing for many of our schools and concern over local ability to pay issues, any information gleaned from this study may prove invaluable as we attempt to give our children the best education possible. All over the country states find themselves in courts challenged to equalize funding for all students and schools. This is occurring at the same time that accountability in the product of the educators' efforts are under the microscope. The outcomes in achievement and behavior in these days of low test scores and unsafe schools is one of our country's major issues.

Here is a list of the schools in your division that are among the schools in this study.

1.

2.

In an effort to accomplish the goals of this study, I need the following information; data on student achievement, behavior, free and reduced lunch recipients, and building condition. The complete listing of schools in this study will be included in the appendix, when the entire study is done, but no individual school will be identified by school number, name, or division in the body of the report. Please be certain that the goal of this study is not to compare schools or school divisions, but to investigate any relationship among the variables of building condition, achievement, and behavior. All information will remain anonymous concerning any one individual school.

I am enclosing a pre-stamped, pre-addressed post card on which I request permission that the schools in your division be included in this study, and the name of the central office person who will handle data collection. Previously done studies of this type have been shown to require a total time investment of less than one hour to complete the data collection. If you decide that you cannot participate in this possibly valuable study, then you can advise me of that on the post card also.

The surveys requesting needed data will be mailed to you by the second week in January of 1994, and I hope to have all work completed in March or early April. Of course, I will send a copy of all results to you upon request.

Thanks in advance for all of your help, and please call me with any questions at Virginia Beach City Public Schools, (804) 490-8540.

Yours truly,

Eric W. Hines

Doctoral Student

Virginia Tech

APPENDIX E

Post Card

Superintendent

Division No. _____

Div. No. _____

☐ Yes, my division will participate and the contact person is:

Name: _____

Address: _____

_____

_____

☐ NO, my division will not participate.

APPENDIX F

April 21, 1994

1 -

2 -

3 -

Dear 1 -

Thank you for participating in this research project studying the relationship between facility condition and student behavior and achievement.

There is an envelope enclosed for each school in your division which has been identified as an urban high school for the purposes of this study.

Please complete the Commonwealth Assessment of Physical Environment and provide the information requested on the Behavior, Achievement, and Free/Reduced Lunch Information form. Then return both items in the pre-addressed/stamped envelope. Should you need clarification of any items, please contact me at work (804) 490-8540 or at home (804) 499-4369.

This study depends so much on your willingness to participate, and I thank you for your time and effort.

Thank You,

Eric W. Hines

Doctoral Student

Virginia Tech

APPENDIX G

COMMONWEALTH ASSESSMENT OF PHYSICAL ENVIRONMENT (CAPE)

Instructions: Please indicate the status of your facility in each area by circling the most appropriate description for each of the following questions. You may provide additional information in the space provided after each question.

SURVEY INSTRUMENT

1. What is the age of your facility?

[A facility's age is your best estimate of the time period during which most of the space used by students was built. If the space was fully updated to the building standards of a later time period, consider the school in the later time period.]

A.	60 Years Old or Older	E.	20-29 Years Old
B.	50-59 Years Old	F.	10-19 Years Old
C.	40-49 Years Old	G.	Under 10 Years Old
D.	30-39 Years Old		

Comments:_____

_____

2. Are there windows in each instruction space (classroom)?

A. Windows are in fewer than 1/4 of the instructional spaces.

B. Windows are in at least 1/4, but fewer than 3/4 of the instruction spaces.

C. Windows are in at least 3/4 of the instructional spaces.

Comments:_____

_____

3. What kind of flooring is found in the majority of the instruction spaces.

A. Wood Floor

B. Tile or Terrazzo

C. Carpet

Comments:_____

_____

4. Do the majority of classrooms have individual heat control?

A. Yes

B. No

Comments:_____

_____

5. Is the instructional area of the facility air conditioned?

A. Yes

B. No

Comments (with percentages if available):_____

_____

6. When was the last time the interior walls, including classroom spaces were painted?

A. Over 15 Years Ago

B. Between 8 and 15 Years

C. Less Than 8 Years Ago

Comments:_____

_____

7. When was the last time the exterior walls, or windows and trim, were painted?

A. Over 7 Years Ago

B. Between 4 and 7 Years

C. Within the Last 4 Years (or) No Exterior Surface Requires Periodic Painting.

Comments:_____

_____

8. Are there visible indications of roof leaks?

A. Ceiling is deteriorating due to water damage, and/or water falls in some areas of facility requiring buckets for water collection.

B. Ceiling is currently developing a few new stains due to minor leaks.

C. No visible signs, or only a few old water spots in ceiling.

Comments:_____

_____

9. Which of the following facilities are adjacent to, or part of, the school complex? Please circle all that apply.

A. Football Field

B. Baseball Field

C. Soccer Field

D. Tennis Courts *(circle the number of courts)*

1-2 3-5 Over 5

E. Swimming Pool

F. Softball Field

Comments:_____

_____

10. How often are the instructional area floors swept (if wood, tile, or terrazzo) or vacuumed (if carpeted)?

A. Monthly

B. Weekly

C. Daily or More Frequently

Comments:_____

_____

11. How often are the instructional area floors mopped (if wood, tile, or terrazzo) or cleaned (if carpeted)?

A. Annually

B. Monthly

C. Weekly or Daily

Comments:_____

_____

12. Is graffiti commonly found on premises? Circle Yes or No for each listed area:

A.	Bathrooms	Yes	No
B.	Lockers	Yes	No
C.	Hallways	Yes	No
D.	Classroom Walls/Doors	Yes	No

E. Other Interior Surfaces Yes No

Please Specify_____

F. Exterior Walls Yes No

G. Exterior Walkways Yes No

H. Other Exterior Surfaces Yes No

Please Specify_____

Comments:_____

_____

13. How long does the graffiti remain before it is removed?

A. Until summer maintenance or the next painting cycle

B. More than a week, less than a month

C. Less than a week (or) no to all parts of #12

Comments:_____

_____

14. What is the condition of the lockers?

A. Most are not functional or not in good repair

B. At least 3/4 of the lockers are functional and in good repair.

C. Over 3/4 of the lockers are functional and in good repair.

Comments:_____

_____

15. What type of material is used for interior ceilings?

A. Wood or open beams

B. Plaster or acoustical tiles in at least 3/4 of the instructional spaces

C. Acoustical tiles throughout the instructional space

Comments:_____

_____

16. Please indicate which utilities or equipment are available and in usable condition in the science labs (please circle all that apply).

A. Gas

B. Water

C. Sinks

D. Electricity

Comments:_____

_____

17. How long ago was science equipment updated to current standards?

A. Over 10 years ago

B. Between 5 and 10 years ago

C. Less than 5 years ago (or) the building is less than 5 years old.

Comments:_____

_____

18. What type of lighting is available in the instructional areas?

A. Incandescent Lighting

B. Fluorescent Lighting

Comments:_____

_____

19. What is the condition of the classroom furniture?

A. Most rooms have furniture that is either facially scarred or functionally damaged.

B. Though at least half of the rooms may have some minor facial scars on the student desks, all the furniture is sound and looks satisfactory.

C. All of the classrooms have furniture which is functionally sound and facially attractive.

Comments:_____

_____

20. What is the condition of the school grounds?

A. There is no landscaping, and sidewalks are either not present or damaged (it is unattractive to the community).

B. There is landscaping and the sidewalks are present and in good repair (it is acceptable to the community).

C. The landscaping and other outside facilities are attractive and well maintained (it is a center of pride for the community).

Comments:_____

_____

21. What color are the walls in the instructional areas?

A. Dark Colors

B. White

C. Pastel Colors

Comments:_____

_____

22. Is the facility located near a busy major highway, a frequently used rail line, an area where aircraft frequently pass overhead, or any other loud noise-producing environment?

A. Yes, and no measures have been taken to reduce the level of noise within the facility.

B. Yes, but measures have been taken to reduce the level of noise within the facility.

C. No

Comments:_____

_____

23. What do you consider to be the condition of your facility cosmetically and structurally?

A. Below Standard

B. Standard

C. Above Standard

Comments:_____

_____

PLEASE PROVIDE TO THE FOLLOWING INFORMATION IF YOU CAN:

24. What is the approximate gross square footage of your facility? (Use building's rough dimensions)

_____	x	_____	=	_____
LENGTH	*(times)*	WIDTH		GROSS SQ. FT.

25. What is the approximate acreage of your school site?

_____ ACREAGE

If there are any areas on this assessment instrument which you feel require further comment, please note them and your comments in the space provided. Thank you for your time and assistance in completing this assessment of your facility's physical environment.

Comments:

If you have any comments regarding the possible relationship between building condition and student behavior or student achievement, please make them below.

Comments:

APPENDIX H

School Number _____

School Name_____

BEHAVIOR, ACHIEVEMENT

AND

FREE/REDUCED LUNCH INFORMATION

Instructions:

The following information is needed in order to complete research on the relationship between facility condition and student achievement and behavior. You may attach documents which provide this information or transfer the information to this form. **Then return this form with the completed building assessment instrument in the envelope provided**.

1. Please indicate the school's achievement test (TAP) results for 11th grade students in the 1992-93 school year, as found on the administrators summary in scale scores (SS). [You may attach the division wide report for grade 11 as long as it lists the schools separately and the scores for each of the sections: reading comprehension, mathematics, written expression, information, basic total, social studies, science, composite total.] Please report real scores and not percentile scores.

Reading Comprehension_____SS

Mathematics_____SS

Written Expression_____SS

Information_____SS

BasicTotal_____SS

Social Studies_____SS

Science_____SS

Composite Total_____SS

2. Please indicate the number of students (or the percent of membership) eligible for free or reduced lunch during the 1991-92 school year, as reported to the division October 31, 1991. [You may attach the division wide report for October 31, 1991, as long as it lists the schools separately and gives a total for free and reduced lunches or a percent of membership free and reduced.]

Number of students qualified for free meals_____

Number of students qualified for reduced meals_____

or

Percent of membership qualified for free/reduced meals_____

3. Please indicate the number of suspensions, in-school and out-of-school, and the number of expulsions during the 1991-92 school year, as reported to the division for students in grade 9 and above.

Number of expulsions_____

Number of students suspended in-school_____

Number of students suspended out-of-school_____

4. Percentage of minority students_____

5. Please indicate the number of incidents of crime and violence during the 1991-92 school year, as reported to the division for the state report mandated in the code of Virginia Section 22.1-180.1.

	Grade 9	Grade 10	Grade 11	Grade 12
physical assault: staff by students				
students by students				
students by non-students				
sexual assault: staff by students				
students by students				
students by non-students				
homicides on: staff by students				
students by students				
students by non-students				
possession of weapons				
possession of drugs				
possession of alcohol				
possession of tobacco				

APPENDIX I

Form used to Consolidate School Information

QUESTION #	CONDITION 1 Substandard	CONDITION 2 Standard	CONDITION 3 Above Standard
#1			
#2			
#3			
#4			
#5			
#6			
#7			
#8			
#9			
#10			
#11			
#12			
#13			
#14			

QUESTION #	CONDITION 1	CONDITION 2	CONDITION 3
#15			
#16			
#17			
#18			
#19			
#20			
#21			
#22			
#23			
#24			
#25			
TOTALS BY CONDITION			

1.

Reading Comprehension_____SS Basic Total_____SS

Mathematics_____SS Social Studies_____SS

Written Expression_____SS Science_____SS

Information_____SS Composite Total_____SS

2.

Number of students qualified for free meals_____

Number of students qualified for reduced meals_____

or

Percent of membership qualified for free/reduced meals_____

3.

Number of expulsions_____

Number of in-school suspensions_____

Number of out-of-school suspensions_____

4.

	Grade 9	Grade 10	Grade 11	Grade 12
physical assault: staff by students				
students by students				
students by non-students				

	Grade 9	Grade 10	Grade 11	Grade 12
sexual assault: staff by students				
students by students				
students by non-students				
homicides on: staff by students				
students by students				
students by non-students				
possession of weapons				
possession of drugs				
possession of alcohol				
possession of tobacco				

APPENDIX J

Free Responses From School Division Personnel

1. This is the oldest school with the smallest site (average) of any of the big schools in this division. There is, I feel, a direct correlation between pride and performance.

2. Environment is a key to behaviour and achievement. Students in a well-maintained classroom that physically has a no-nonsense atmosphere enables students to feel safe. Safety is the basic element that enhances the students ability to devote their attention to the lesson at hand.

3. The school has a planetorium. This is a source of pride in our school, and goes on to other areas.

4. A very clean and attractive building makes for a positive faculty and student body!

5. A 27-year-old heating/cooling system is outdated with even heat distribution not possible resulting in some classrooms very hot and others very cold in winter and summer. This is not conducive to learning.

6. The student behavior and student achievement can't be correlated with this facility information. Student data was from the old building. This information is from the new building.

7. This school prides itself in the absence of grafitti and vandalism damage. Fast response and a sense of urgency make this possible.

8. I feel strongly that a good looking, well-maintained building correlate positively with student behavior and achievement.

9. Uniforms would also help. The behavior of the student would inprove as would test scores because they would be paying attention to things of importance.

10. Students act better when it is expected of them.

11. We will always do what we can to provide our students with the best facility possible. There is a positive correlation between that and behavior.

VITA

Eric Wayne Hines

4726 Red Duck Court

Virginia Beach, Virginia 23462

Telephone Home: (804) 499-4369

Office: (804) 490-8540

EDUCATIONAL BACKGROUND:

Doctor of Education

Education Administration, Virginia Polytechnic Institute and State University, July, 1996. The dissertation addressed the relationship between building condition and student achievement and behavior.

Certificate of Advanced Graduate Study

Education Administration, Virginia Polytechnic Institute and State University, August, 1993.

Master's Degree

Guidance and Counseling, University of North Carolina - Charlotte, June 1976.

Bachelor's Degree

Sociology, Norfolk State University, June, 1973.

EMPLOYMENT:

Director, Virginia Beach City Public Schools, Office of Custodial Services, Virginia Beach, VA.

Assistant Director, Virginia Beach City Public Schools, Office of School Plant and Supply, Virginia Beach, VA.

Distribution Manager, Hoechst-Celanese Chemicals

Vocational - Education Coordinator, Charlotte-Mecklenburg Public Schools.

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