

**BUILDING CONDITION
AND
STUDENT ACHIEVEMENT AND BEHAVIOR**

by

Carol Scott Cash

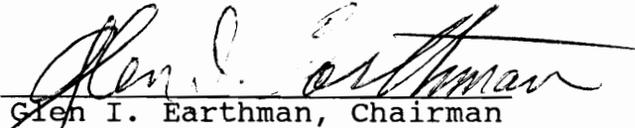
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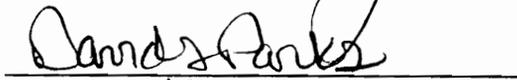
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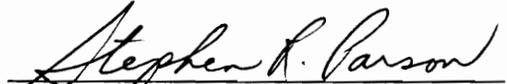
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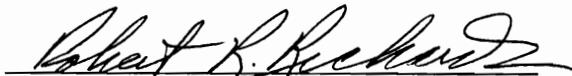
Educational Administration

APPROVED:


Glen I. Earthman, Chairman


David J. Parks


Stephen R. Parson


Robert R. Richards


Donald J. Shoemaker

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Carol Scott Cash

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. The entire population of small, rural high schools in Virginia was 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 forty-seven schools in the population. Student achievement was determined by the scale scores of the Test of Academic Proficiency for grade eleven during the 1991-1992 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 of covariance, correlations, and regression analysis.

This study found the 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. Cosmetic building condition appeared to impact student achievement and student behavior more than structural building condition. Finally, varying climate control, locker, and graffiti conditions were factors which were positively related to student achievement scale scores.

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DEDICATION

This study is dedicated to my family who have loved me throughout a lifetime of learning. It is especially dedicated to my husband, Paul, who has been and will always be my hero; to my dad, Scotty, whose life was my inspiration; and to my mom, Teecy, who told me I could, believed what she said, and loved me always. Finally, thank you, Scott and Sandra, for sharing your growing years with my books and papers; and thank you, Mary, for being not only a sister, but also a friend. I am truly blessed.

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BUILDING CONDITION AND STUDENT ACHIEVEMENT AND BEHAVIOR

Introduction

The message sent to a student about the quality of instruction, its level of importance, and the existence of concern is often tempered to an extent by the status of the facility condition. A student may assume the faculty and staff of a poorly maintained building will accept or expect a lower standard of behavior and a lesser effort in academic achievement. Likewise, a student may assume the faculty and staff of a well-maintained building will expect and demand a higher standard of behavior and achievement. If the parents and community outside the school send a different message, the students, at best, may be receiving a mixed message.

Studies have been conducted in business which have related employee production to physical environmental conditions and concluded that a better environment is related to higher production and greater employee satisfaction (Eilers, 1991; Glassman, Burkhart, Grant, & Vallery, 1978). Those studies have encouraged better ventilation, lighting, space utilization, and other physical environmental factors (Lexington, 1989). Health and morale issues have frequently been related to building conditions

and subsequently associated with production variations (Eilers, 1991).

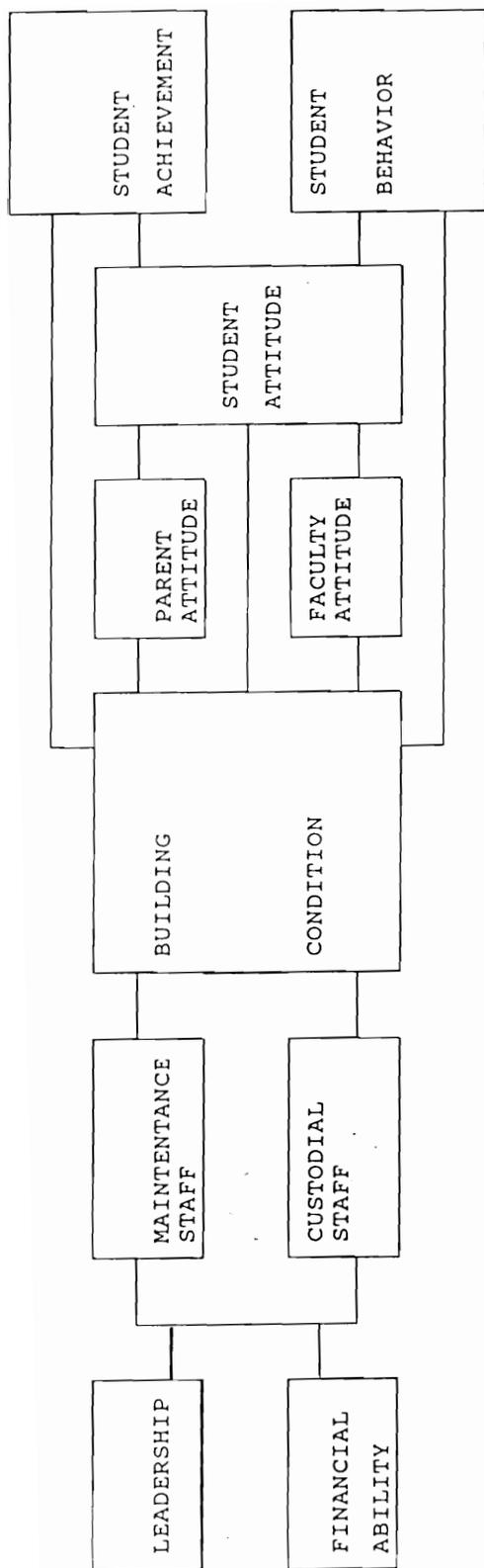
If adults in a work environment are affected by their surroundings, then it is logical to predict that students are similarly affected. Educational research by McGuffey and Brown (1987) points to a negative relationship between building age and student achievement. Chan (1980) found a positive relationship between physical environment and middle grade achievement. Because students are required to attend school and are assigned to a school because of the location of their residence, they have less opportunity to leave a poor environment and, at the same time, are more dependent on someone else to correct unsatisfactory conditions.

The quality of the school's infrastructure may be an indication of the importance society places on education. If so, current information regarding the declining quality of the infrastructure suggests the future of such an institution could be in grave doubt. A recent survey of capital construction project funds indicated the state of Virginia needs \$2226.00 per pupil for anticipated expenditures to address current school facility needs (Earthman & Pantelides, 1991). Another report on the condition of buildings throughout the United States found less than half (42%) of them in good condition (Education

Writers Association, 1989). This report excluded information regarding the state of facilities in Virginia, but a more recent survey by the Virginia Department of Education (1992) found almost three-fourths of the schools in the state were in need of major renovation or replacement. This Virginia survey discovery and current student test and discipline data might have created an interest on the part of the state regarding the possible impact of poor building conditions on selected student outcomes. Research which supports a relationship between facility condition and student behavior and achievement could prompt consideration for improvement. It could also provide evidence for the argument to provide greater funding of facilities at the local level.

Model Design

If, as research has suggested, a relationship can be found between school physical environment and student outcome variables, then school leadership can make informed decisions which would potentially affect student behavior and achievement. The theoretical model design (Figure 1) used in this research was developed to show such a relationship. In the theoretical model design, attention



MODEL DESIGN
Figure 1

was directed to student achievement and behavior as affected by the quality of the school's facilities.

A theoretical model which addressed the relationship between building condition and selected student outcomes would be incomplete if it failed to address the set of circumstances which preceded current building condition. The question of what brought the building to its current condition must be considered.

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

School leadership in the form of a school board, a superintendent, or perhaps an 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 mindset or vision comes a feeling regarding the importance of the physical plant which houses the educational process. If the level of importance is high, then emphasis will be placed on creating a physical environment which promotes quality education. This emphasis will materialize in securing

maintenance and custodial staff in adequate numbers and providing them necessary training, supervision and available resources to assure their success. What the leader communicates as important to the vision of the school, the staff interprets as important in performance.

The building condition is a product of the maintenance and custodial staff, if not initially, then certainly as it weathers time. As a building ages, maintenance which is left undone multiplies the need for additional maintenance. Poor custodial performance only exacerbates the problem of deferred maintenance.

The model contends building condition potentially affects student achievement and student behavior directly and indirectly. The direct impact to student achievement and student behavior might come from climate control, illumination, density, acoustics, color or availability of resources. The indirect impact to both student achievement and student behavior might come from student attitude which can be influenced by both faculty and parental attitudes. All might be affected by how well-maintained a building appears. The building's appearance could be viewed as an indication of the importance the leaders place on education. If building appearance is the physical expression of the community and if appearance is good, it provides a positive influence on those who view it.

Not only might students' attitudes affect their behavior and their achievement, their behavior and achievement could affect each other. This phenomenon can be cyclical in nature. When students behave poorly, they may achieve less; additionally, when they fail to achieve, they may misbehave.

Student outcomes in behavior and achievement are complex, affected by many factors. Student achievement is highly correlated with socioeconomic status (SES), but when SES is held constant, the impact of building condition can be evaluated for its significance. Less work has been done in the area of behavior, but some research has indicated that behavior is also impacted by the building's condition.

Although this theoretical model can be applied to any school, in this study it was applied to small rural high schools. Student behavior varies with school size and location. Variance in the student achievement attributed to building condition, identified by Edwards (1992) recent study of Washington DC schools, was between 3 and 8 percent. With that range of variance, any study which expanded the population to all schools, urban and rural, large and small, might experience difficulty finding the same relationship. A more homogeneous grouping might allow more definitive findings.

Because urban schools were studied recently, rural

schools were a viable alternative. Small, rural high schools have common needs which are only exacerbated by poor building condition. The student population is relatively stable so the achievement and behavior indicators might be more directly indicative of current school environment.

Research Question

What is the relationship between the condition of the facilities and student behavior and student achievement in small, rural high schools in Virginia?

Purpose

The purpose of this study was to examine the possible relationship between certain school building conditions and student achievement and behavior in small rural high schools in Virginia. If physical conditions proved to impact student achievement and behavior, then modifying the physical building environment could have a predicted impact on student achievement and behavior.

Significance

Although effective schools research and recent reform

reports recommend instructional changes, they have mentioned facilities almost as an afterthought. Tentative studies by McGuffey and others have identified a relationship between facility condition and achievement (McGuffey & Brown, 1978; Chan, 1979; Chan, 1980). Definitive research findings regarding the relationship, however, are not in existence. If there is a relationship, it is important to local school boards, as well as state departments of education, to recognize that relationship. If raising the level of student achievement is an important issue to local school boards, these bodies may well want to improve the physical school environment of the student.

As localities address concerns in student achievement and behavior, it is important to pay attention to facility needs. Facilities account for a substantial amount of the local investment in education and should provide the most effective support of student performance.

The state is not currently maintaining a state-wide information base regarding the condition of Virginia's school facilities; if the state accepts a role in facility maintenance, a report of facility condition of small rural high schools would give the state a starting point for a comprehensive plan for addressing identified needs.

Further, with the heightened concern for student order, any identified relationship between poorer facilities, in

quality or condition or both, and student disorder could be an impetus for building improvement. Because many factors relating to student disorder are less easily remedied, local officials might view facility condition as a variable which could be controlled.

The dedication of funds or approval of bond issues by the local communities often requires strong justification for the need of those funds. Voters frequently see buildings nostalgically instead of in relationship to current health and safety standards or educational needs. A document which argues effectively, through empirical data, for the need to improve facilities in order to ensure a quality education for young people would be a strong asset to local government leaders.

Definitions

For purposes of this study, the following definitions apply.

1. According to the Virginia Statistical Abstract (1992), the current Census Bureau definition of a **rural area** is one that is not specifically designated as urban.

Urban population includes all persons living in (a) places of 2,500 or more inhabitants incorporated as cities,

villages, boroughs, and towns ..., but excluding the population living in rural portions of extended cities...; (b) census designated places of 2,500 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.

2. A **small high school** is defined as a school which enrolls fewer than 100 students in grade twelve.

3. **Student achievement** is defined in eight ways. It is the scaled score on the Test of Academic Proficiency (TAP), administered to juniors during the 1991-92 school year, for each of the following: reading comprehension, mathematics, written expression, sources of information, basic composite, social studies, science, and complete composite. Each is used as a dependent variable.

4. **Student behavior** is defined in three ways. First, it is the ratio of the number of suspensions, in-school and out-of-school, to the number of students enrolled in high school grades in the 1991-92 school year. Second, it is the ratio of the number of expulsions to the number of students enrolled in high school grades in the 1991-92 school year. Third, it is the ratio of the number of incidents of violence and substance abuse in schools, as reported to the Virginia Department of Education, to the number of students enrolled in high school grades in the 1991-92 school year. Each score is used as a dependent variable.

5. **Facility condition** is defined as the rating of substandard, standard, or above standard, which is obtained from the Commonwealth Assessment of Physical Environment (CAPE). CAPE is a researcher-developed instrument which includes factors related to climate control, acoustics, illumination, student density, science equipment adequacy, building age, and cosmetic facility condition. This rating is used as an independent variable (Appendix H).

6. **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 1991-92 school year. This factor is used as a covariate to control achievement and behavior variance related to SES.

Delimitations

1. The restriction of this study to small rural high schools is based on the need to minimize the impact of other variables on student achievement and behavior. It is also done because similar recent research has already focused on urban schools (Edwards, 1992). There are studies which relate both student order and achievement to size of school, so size has been restricted to minimize the effect of the variable of size (Coe, Howley, & Hughes, 1989; Gottfredson, 1985; McGuffey, 1991). Further, urban and rural schools may be dissimilar in the nature and frequency of student disorder.
2. The wealth of a community is highly correlated to student achievement. Although many of the small, rural schools are found in areas with similar economic condition, a measure of socioeconomic status (SES) is used to control that variable.

3. This study is limited to Virginia because each state addresses school capital outlay needs uniquely. While other states provide grants or other monies to assist those areas of greater fiscal need, Virginia's sole state contribution to local capital needs is low interest loans (Earthman & Pantelides, 1991).

Limitations

1. The survey instrument requires local district personnel to assess their facility conditions. Any self-survey instrument has a limitation on objectivity of data.
2. It is impossible to identify all the variables which could affect student achievement and behavior. This could result in a large error variance and a less significant correlation in the variables of interest.
3. The delimiting of the population results in more limited generalizability of the results to a broader population. Because the study involves only small, rural high schools, the results cannot be applied to larger or urban high schools.

Organization of the Study

This study has five chapters.

Chapter I contains the introduction, the research question and subquestions, the purpose, the significance, the definitions, the delimitations and 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. Literature is presented which suggests a connection between facility condition and achievement, and a discussion of the limited research in that area is included. It further addresses environmental impact on production in industry as support for this study.

Chapter III contains the research design, including areas of interest and methods of statistical evaluation.

Chapter IV contains the analysis of the findings from the gathered data.

Chapter V contains the summary of findings, conclusions, and discussion which can be drawn from the analysis and suggestions for further study.

CHAPTER TWO

REVIEW OF LITERATURE

The theoretical model is based on research which supports the possibility of a relationship between certain building conditions and student achievement and behavior. Lane (1991) indicated school facilities could either enhance or detract from the educational program. The research and literature which address this relationship are reviewed by topic and used as a springboard for further investigation.

Leadership

The leadership of the school system, which could include the principal, the superintendent, and the school board, determines the emphasis placed on areas within the system. The importance of maintenance and building condition is also determined by the importance placed on this aspect of the school system by the leadership. A leader who places emphasis on facility condition provides training and personnel, both custodial and maintenance, to create and maintain the envisioned physical environment. The system's leadership may not be entirely the beginning of the circumstances which result in an acknowledged level of

acceptable facility condition. The institution which provided training necessary for certification for the position of leadership may also be responsible for instilling a vision which includes a position on the importance of a given level of facility condition.

Maintenance and Custodial Staff

Maintenance and custodial performance are highly impacted by leadership's commitment to building condition. Maintenance and custodial personnel need to be well trained, well equipped, and equitably assigned to provide for the school infrastructure. This is generally not the case in school systems in the United States today, and in Virginia specifically. Schoolhouse in the Red, written by the American Association of School Administrators (1992), had the following to say about nationwide maintenance:

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. (p. 11)

The Commonwealth of Virginia Department of Education prepared a report, School Facility Status Survey (January 10, 1992), which concluded 47 percent of Virginia's facilities have deferred maintenance and 71 percent need major replacement or renovation. While building needs have increased because of years of deferred maintenance and natural aging, attention has not been directed toward custodial and maintenance staff needs.

The number of custodians and physical plant employees has often dropped, while the school population has increased (Education Writers Association, 1989). For example, Lantz, assistant superintendent in Baltimore, Maryland, indicated, in Wolves, the custodial staff in his district was half the number of custodians as was employed in 1972, even though the number of buildings had not decreased and the actual land area had increased. Another superintendent indicated he had seen a relative decrease in the physical plant division budget and a drop in the number of employees in that division, even though the district enlarged its services and number of facilities. Whatever the reason for the reduction in staff, a higher worker physical plant ratio may result in poorer building condition.

Direct Effects

Lighting

Student achievement and behavior may be directly affected by several physical building attributes. Lighting, acoustics, climate, color and size are factors which have been studied.

A fluorescent lighting study by Chan(1980) looked, in part, at achievement's relationship with presence or absence of fluorescent lighting. The study found little difference in achievement between schools with or without fluorescent lighting. Previous studies showed better perception and lower fatigue to be related to illumination intensity (Tinker, 1939) and student test scores to be positively related to quality of lighting in the classroom (Luckiesh and Moss, 1940). According to Sleeman and Rockwell (1981), fluorescent fixtures were better than incandescent ones for glare reduction and diffused light production. Lighting was one of the factors which affected worker productivity, with better lighting associated with greater productivity (Lexington, 1989; Ruch & Hershauer, 1974).

Hawkins and Lilley (1992), in their most recent revision of the Council of Educational Facility Planners International's (CEFPI) Guide for School Facility Appraisal, addressed illumination. Although they acknowledged that

lighting authorities were not in agreement on the direct effect of illumination on learning, they contended a minimum standard was needed for successful classroom performance. Hawkins and Lilley further noted that the Illumination Engineering Society recommended 50 footcandles for regular classwork and 100 foot candles for chalkboards. (p.18)

Lighting, at least in terms of the existence of natural light, has been related to student behavior. A study which compared student achievement and behavior in windowless and windowed classrooms concluded through anecdotal information that the students were less restless in windowless schools than in schools with classroom windows (Larson, 1965). Interestingly, in the work environment, Stumpf (cited in Lexington, 1989) wrote about a type of depression, seasonal affective disorder (SAD), which was asserted to be caused by reduced access to sunlight during winter months. He felt natural light was important in combatting SAD. Sleeman and Rockwell (1981) wrote that the feeling of isolation and lack of contact with the outdoor environment was a common complaint. Hawkins and Lilley (1992) also acknowledged the potential for a quality educational environment was increased with a minimum of one window in each instructional space. While light quantity and natural light are not conclusively important to student behavior and achievement,

there is enough discussion to warrant the consideration of light when studying facility condition.

Acoustics

Acoustics, the insulation against sound, is another factor of importance to student achievement and behavior. Several studies have looked at the impact of noise which required acoustical consideration. Bronzaft and McCarthy (1975) studied the effect of elevated train noise on reading ability as measured by standardized reading scores in a school in New York City. They concluded that extreme noise adversely affects reading scores.

A study related to aircraft noise (Cohen, Evans, Krant, & Stokols, 1980) looked at its impact on elementary school children in Los Angeles in the areas of attentional strategies, feelings of personal control, and physiological processes related to health. The study found some children from noisy schools had higher blood pressure, less cognitive task success, and greater feelings of helplessness. The students gave up more easily on tasks and exhibited greater distractibility from the task at hand.

The nonauditory effects of noise on behavior and health were further investigated by Cohen and Weinstein (1981). They reviewed previous research and contended elevated

arousal, which can adversely affect attention in complex tasks, was a result of exposure to moderate and high-intensity noise. Unusual noise interfered with task efficiency and even familiar noise affected attention to and vigilance in multiple tasks. Noise increased the chance of inattentiveness which could have resulted in accidents or errors.

Socially, people who live in noisy areas were less willing to respond to requests for assistance (Page, 1977). The study had people seek assistance from people who were located in noisy areas and found they gave information, directions, or other assistance less frequently than people who were approached in less noisy areas. Reduced sensitivity was also evident in noise zones (Sauser, Araiz & Chambers, 1978). Even arrest levels and school truancy were associated with higher noise areas.

The noted studies have shown a relationship between noise and student achievement and behavior. The containment of noise through acoustical installation or alternate facility site are important educational administrative decisions. Carpets and ceiling tiles are excellent internal insulators of sound.

Chan's (1980) study showed a positive correlation between carpeted instructional areas and higher achievement levels. Hawkins and Lilley (1992) discussed acoustical

treatment of ceilings, walls and floors for effective sound control as well as site location and external noise barriers, when necessary. They contended that areas would be more effective for teaching and learning if reasonable effort was made to control sound.

Climate Control

Climate control is the third factor which has been of great interest to educational and industrial researchers. Chan (1980) found students in schools with air conditioning had higher achievement scores than those students in schools without air conditioning. Nolan (1960) found higher temperatures have a negative relationship with academic learning, while Peccolo's (1962) work supported maintenance of an ideal temperature range for achievement. Stuart and Curtis (1964) found achievement and student conduct to be affected by temperature variance, while Harner (1974) found a relationship between temperature and specific academic skills. As temperature and humidity increased, achievement and task performance deteriorated and attention spans decreased; cooler temperatures were associated with comfort and productivity (King & Marans, 1979). Scagliotta (1980), in observing conduct of children with learning problems noticed a relationship between atmospheric conditions and exhibited maladaptive behaviors on given days, indicating a

controlled atmosphere would allow less variability. Hawkins (1992) also felt the learning environment reflected increased quality if the temperature was properly maintained.

Color

The effect of the color of interior walls upon student achievement and behavior has also been researched. Studies have found increased performance of students in buildings where the walls were painted in pastel colors (Rice, 1953). The right combination of colors also impacted the achievement of students in a study by Ketcham (1964). A change in the color scheme at Sun-Maid Growers laboratory was followed by improvements in worker productivity and production efficiencies (Eilers, 1991). This positive result was the impetus for initiating a change in the color scheme throughout the plant. Rice (1953) also found increased student achievement in buildings where the walls were freshly painted, regardless of the color. This was a result of a study which looked at achievement in buildings with walls in need of paint, those with walls freshly painted white, and those with walls freshly painted in pastels. Although the greater achievement was identified with the pastel colors, even freshly painted white walls

were associated with higher student achievement than walls in need of paint.

Building Age

While light, acoustics, climate, and color are individual attributes which reflect building condition and impact student outcomes, age of building has been found to be a valid proxy variable for general facility condition. McGuffey and Brown (1978) studied influence of building age on academic achievement of pupils in grades four, eight, and eleven in Georgia. They used school building age as the measure of the cumulative effects of the thermal, visual, acoustical, and aesthetic environment. Their research found academic achievement by students to be negatively related to building age.

Density

Although building density is not a direct reflection of the facility, but rather a reflection of the population size which inhabits it, density is a factor which should be considered when studying the importance of facility condition on student achievement and behavior. Glassman, Burkhart, Grant, and Vallery (1978) studied students in high density and low density housing conditions at Auburn

University. They found a significant difference in grade point average (GPA) between the groups, with higher GPA's associated with lower density living conditions. Those students also had higher satisfaction ratings concerning the housing condition than students in higher density living environments. A second study the following year indicated complaint quantity and dissatisfaction were both greater under student high density conditions. The researchers concluded that high social density adversely affected extended task performances and was experienced by those exposed to it as a social stressor.

Indirect Effects through Attitude

Building condition can directly impact student achievement and behavior because of the physical factors related to sound, light, and temperature. Building condition can also affect the attitudes of students directly or the attitudes of teachers and parents which affect student attitudes. These building conditions fall into the category of aesthetics, the way the building looks or how it is maintained. Hathaway (1991) saw a direct influence of facility on learning and performance and an indirect influence on attitude and behavior.

Indirect effects were discussed by Hawkins and Stack (1978) who referred to school buildings as ambassadors for a school division. They also indicated responses to national opinion polls about whether or not schools were good indicated that modern school buildings and equipment were common public concerns. The public appeared to associate the quality of student achievement with the quality of the school building.

Christopher (1991) also wrote about the effects of architecture on education. He asserted facilities could inspire students and teachers to perform better. Some of the schools he visited showed a 20% increase in test scores the first year after a move from an older facility to a new one. He noted students felt better about themselves, and teachers performed and dressed differently in the new facility. A quality environment can enhance an individual's performance, as a teacher or as a learner. Mackenzie (1989), in a study on vandalism, found communities which viewed schools as aesthetically pleasing demonstrated an enhanced sense of pride, which minimized the rate of property destruction. According to White and Fallis (1979), the relationship between poor maintenance and vandalism or graffiti was the implied message that no one cared whether or not the building was damaged or further damaged. Poor maintenance created an environment which affected student

and staff in discipline, pride, and morale. Repairs which were immediate sent the message that standards of school appearance were high and were effective in minimizing vandalism.

Cramer (1976) studied how student attitudes were related to new, renovated and dilapidated facilities. He found pupils in older dilapidated buildings had higher major disruptive incident ratio per pupil than students in either of the other two facilities. Pupils in the older, dilapidated facility scored significantly lower on the attitude scale as well. Rice's (1953) revelation that student achievement increased in freshly painted areas, regardless of wall color, indicated students' attitudes were positively affected by the changed environment. They reacted to an aesthetically improved physical environment. Because the structure was the same, the change could be attributed to a more positive student attitude. The findings supported a positive relationship between attitude and behavior.

In a study of schools in Washington, DC, Edwards (1992) found a positive relationship among building condition, parental involvement, and student achievement. Parental involvement was measured by PTA participation.

Summary

Individual building condition factors have been identified as elements which impact student behavior or achievement. Research has supported a positive relationship between student achievement and lighting quality and quantity. Studies of environmental noise have found student behavior and achievement positively related to acoustical elements and negatively related to noise levels. Pastel wall color and presence of air conditioning have also been positively associated with student achievement or industrial employee productivity.

While research has touched on physical environmental effects on student achievement and behavior directly and indirectly, it has not been conclusive regarding the extent of the effect. Further research related to schools is needed to identify the effects of building condition and address improvements in the building condition which could encourage increased student achievement and improved student behavior. Hathaway (1991) indicated the consensus was that educational facilities directly influenced learning and indirectly influenced behavior and attitudes. This study has utilized the related research to identify standards for building condition factors in order to develop an instrument which could accurately assess building condition.

CHAPTER THREE

Introduction

This study targeted small rural high schools in the state of Virginia. Small rural high schools are often located in areas with limited fiscal resources. These resources are further strained by the need to maintain and improve school facilities. The students in these areas frequently face more limited socioeconomic conditions, which have been statistically related to achievement outcomes. It is important to investigate any relationship found between facility condition and achievement and behavior. In order to look at the relationship between facilities and student outcomes, a review of information about the population was conducted.

Population

The targeted population was the group of small rural public high schools in Virginia. To determine which schools might become part of the targeted population, schools with a senior class population of less than 100 were identified. They were listed within their school divisions, which were

then used to determine whether or not the schools were rural.

To identify which schools were rural, the eight Metropolitan Statistical Areas (MSA) were identified: Roanoke Standard Metropolitan Statistical Area (SMSA), Lynchburg SMSA, Norfolk-Virginia Beach-Newport News MSA, Washington, D.C. SMSA, Richmond-Petersburg MSA, Charlottesville SMSA, Danville SMSA, Johnson City-Kingsport-Bristol SMSA. (Virginia Statistical Abstract, 1992). Schools within Metropolitan Statistical Areas (MSA) were deleted from consideration as part of this study's population, unless they were located in rural sections of the area. Three schools, located in two counties, were identified as rural, although they were located within a Metropolitan Statistical Area, because of local populations ranging from 67 to 918. The populations of other incorporated towns or cities or census designated places having schools with fewer than 100 seniors were reviewed using the Virginia Statistical Abstract, 1992. If these areas had populations of 2500 or more, the associated schools were also deleted from the potential population of this study. The remaining schools became the population for this study of small rural high schools.

There were 47 schools in 36 divisions in Virginia which had a population of fewer than 100 seniors and were located

outside urban areas during the 1991-92 school year. The entire population was used in the study. The grade configuration for these high schools ranged from grades ten through twelve to kindergarten through grade twelve. None included fewer than the three upper grades. They were located primarily along the mountainous western border of the state, though a few were sprinkled in the eastern and middle portions of the state. Their total student populations ranged from 90 to 695, their high school student populations ranged from 41 to 547, and their senior class populations ranged from 12 to 99. See Appendix A for a complete list of schools included in the study.

Data Needs

The design of the study permitted a comparison of achievement and behavior scores among schools with facility condition ratings of substandard, standard, or above standard. Behavior scores, achievement scores, and facility condition ratings were determined by the researcher based on the information collected from the individual school. The number of students on free and reduced lunch was also provided by the individual school. The school population was collected from the Virginia Department of Education (DOE).

In assessing achievement, the school was asked to provide the individual school averages, in scale scores, for the Test of Academic Proficiency (TAP), the 11th grade test of the Virginia State Assessment Program administered during the 1991-92 school year. 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 socioeconomic status of each school was determined by the percent of students without approved applications for free or reduced lunch in the school during the 1991-92 school year. This information was collected from the local school.

The final component of the study was the Commonwealth Assessment of Physical Environment (CAPE), a researcher-developed building assessment instrument, which was used by division personnel not assigned to the school building. The instrument was used to categorize buildings as substandard, standard, or above standard. It was also used to place

buildings in two categories cosmetically and structurally.

Demographic information about the school divisions was obtained from the DOE publication, School Enrollment, September 30, 1991, which contained the population of the school by grade level, the overall size of the school population, the size of the school population in grades nine through twelve, and the size of the senior class.

Instrumentation

An assessment instrument was needed to determine the physical condition of each school facility in the study. The assessment instrument used to identify building condition was developed by reviewing current available facility assessment instruments and research regarding facility factors which may affect student achievement and behavior. The facility factors of lighting, acoustics, climate control, color, density, science lab quality, and aesthetics were used to develop objective questions. Written descriptors were included, when necessary, to assist the evaluator in completing the survey items. The assessment instrument was reviewed by three people experienced in facility assessment; the revised instrument was field tested by eight Virginia Beach high school administrators in facilities of varying condition. The

resulting scores placed the eight Virginia Beach schools in the expected relative position from poorer to better quality facilities. Five schools in the study population were randomly selected for assessment by the researcher using the same instrument, and the resulting rating was compared to that rating determined by the responses of the division contact person to determine interrater reliability of the assessment instrument. The two ratings were similar, placing the schools in the same building condition levels.

The revised assessment instrument, the Commonwealth Assessment of Physical Environment (CAPE), was composed of 27 items. The evaluator was asked objective questions concerning the condition of the school facility. The resulting data were used by the researcher to arrive at a score for the building of substandard, standard, or above standard. The designations were used to place schools in groups with three hierarchical levels of building condition; the designations did not necessarily indicate schools had failed to meet specific standards. The schools with building condition scores in the bottom quartile were identified as substandard. The schools with building condition scores in the middle two quartiles were identified as standard. The remaining schools in the upper quartile were identified as above standard.

The Commonwealth Assessment of Physical Environment

(CAPE) was also subdivided into structural and cosmetic items (Figure 2). There were 16 structural items which looked at the building structure and were used to provide a structural building condition rating of either one or two. In order to look at the cosmetic aspects of the building, there were ten cosmetic items which were used to determine a cosmetic building condition rating of one or two. In each case, a one indicated a rating in the bottom two quartiles of the population and a two indicated a rating in the upper two quartiles of the population.

The additional insert solicited scale scores on the Test of Academic Proficiency (TAP) in each area, the number of incidents of crime and violence by students in the high school grades as reported to the school division in compliance with Code of Virginia Section 22.1-280.1, the number of suspensions and expulsions, and the number of students with approved completed forms for free or reduced lunch. The insert was also reviewed by four professional educators for clarity.

Data Gathering

Forty-seven schools in Virginia were identified as small rural high schools (Appendix A). In November 1992, superintendents in those divisions were asked to participate

STRUCTURAL BUILDING ITEMS

1. Building Age
2. Windows
3. Flooring
4. Heating
5. Air Conditioning
10. Roof Leaks
11. Adjacent Facilities
16. Locker Condition
17. Ceiling Covering
18. Science Lab Equipment
19. Science Lab Age
20. Lighting
23. Wall Color
24. Exterior Noise
26. Student Density
27. Site Acreage

COSMETIC BUILDING ITEMS

6. Interior Wall Paint
7. Interior Paint Cycle
8. Exterior Wall Paint
9. Exterior Paint Cycle
12. Floors Swept
13. Floors Mopped
14. Graffiti
15. Graffiti Removal
21. Classroom Furniture
22. Grounds

STRUCTURAL AND COSMETIC ITEMS ON THE
COMMONWEALTH ASSESSMENT OF PHYSICAL ENVIRONMENT

Figure 2

in the study (Appendix D) and to identify a central office contact person. Responses were returned on postcards (Appendix E). Initially twenty-six divisions agreed to participate. Of the remaining divisions, all but eight agreed after direct phone contact. During December 1992, a letter of thanks and instructions (Appendix F) or a letter requesting reconsideration of nonparticipation (Appendix G) was sent with the Commonwealth Assessment of Physical Environment (Appendix H) and the instrument for collection behavior, achievement, and free lunch data (Appendix I) to all school divisions in the population. Appropriate instructions were also included to enable the assessor to process the items systematically, and a pre-addressed and stamped envelope was provided. Several schools reconsidered, and by March 5, 1993, forty-three of the forty-seven (91%) schools in the population had responded. Although there appeared to be no differences between the data collected from early and late responders, the last two respondents provided incomplete information which limited its usefulness.

Data Analysis

Upon the completion and return of the survey instrument and accompanying insert, the data were analyzed using

analysis of covariance to compare the adjusted means of schools with different building assessment ratings. Each of the eight defined achievement means was compared across the three building conditions. The composite total achievement means were also 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 which were directly related to science laboratory quality. Behavior rating means in each of the three areas were also compared among the three building conditions using analysis of covariance. A covariate of socioeconomic status (SES) was used in each case to adjust the achievement means and behavior rating means for SES variance.

Regression analysis was used to compare achievement score means to behavior rating means and achievement score means to age of building.

CHAPTER FOUR

FINDINGS

Upon receipt of the data from the schools in the population, analysis began. First, the data were consolidated. Next, building condition ratings were calculated. Finally, student achievement and student behavior were compared across building condition levels. The findings are reported in the remainder of this chapter.

School Data Sheets

The data were first consolidated and transferred to a data sheet for each school. The school data sheets (Appendix J) were used to determine scores for overall, structural, and cosmetic building condition; suspensions, violence, and expulsion ratios; and free lunch participant percentages.

Building Condition Ratings

Each item response on the Commonwealth Assessment of Physical Environment (Appendix H) was identified on the data sheet as a one, two, or three. The a response was

identified as a one, the b response as a two, and the c response as a three. There were six items with more than three possible responses or with free responses. Those items were coded based on the following criteria:

Item 1

Item one asked the age of the facility and provided response choices of a through g. Buildings fifty years old or older were identified 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); buildings under twenty years old were identified as three (f and g).

Item 11

Item 11 asked the responder to identify the facilities adjacent to, or part of, the school complex. There were seven possible facilities listed and space for other listings. The response was coded one if it indicated two or fewer adjacent facilities; the response was coded two if it indicated more than two, but fewer than four adjacent facilities; the response was coded three if it indicated four or more adjacent facilities.

Item 14

Item 14 asked the responder to identify areas where

graffiti was commonly found on the premises. Seven areas were listed and space was provided for additional areas to be listed. 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 18

Item 18 asked the responder to indicate which utilities or equipment were available and in useable condition in the science labs. Four possibilities were listed, and space was provided for additional comments. The response was coded one if fewer than all four possibilities were marked, two if all four possibilities were marked, and three if all four possibilities were marked and additional utilities and equipment were indicated.

Item 26

Item 26 asked the approximate gross square footage of the facility. The response was coded one if it indicated fewer than 110 square feet per student, two if it indicated at least 110 square feet per student but fewer than 145 square feet per student, and three if it indicated at least 145 square feet per student.

Item 27

Item 27 asked the approximate acreage of the school site. The response was coded one if it indicated 15 or fewer acres; the response was coded two if it indicated more than 15 but fewer than 30 acres; and the response was coded three if it indicated 30 or more acres.

Average Building Rating

The items on the Commonwealth Assessment of Physical Environment were averaged to derive a score which ranged from one to three for overall building condition. The sixteen items related to structural condition and the ten items related to cosmetic condition were averaged separately to arrive at structural and cosmetic subscores ranging from one to three. The resulting scores were grouped into two or three categories in order to compare achievement and behavior factors between or among the groups.

Grouping of Building Scores into Categories

Frequency distributions were generated for each of the building condition scores: cosmetic, structural, and overall building condition. The building condition ratings were assigned from this information.

The overall building condition scores were converted to one (substandard) if they fell below 2.2, two (standard) if

they fell at or above 2.2 and below 2.5, and three (above standard) if they fell at or above 2.5. The cosmetic scores were converted to a one (lower) if they fell below 2.5 and a two (upper) if they fell at or above 2.5. The structural scores were converted to a one (lower) if they fell below 2.2 and a two (upper) if they fell at or above 2.2. Table 1 indicates the count and range of scores in each category.

Adjusted Achievement Scale Score Means

Once the ratings were determined, the achievement score means for each subtest were compared among building condition ratings using analysis of covariance to adjust the means. The covariate was the percent of students who did not qualify for free or reduced lunch. This factor was used to adjust the means for socioeconomic status because of its relationship to the financial status of the students.

Achievement and Building Condition

The adjusted achievement scale score means for the Test of Academic Proficiency for grade 11 during school year 1991-92 were compared among the three building condition ratings (Table 2).

Table 1

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

	RANGE	N	%
Building Condition			
substandard	1.9 - 2.1	10	24.4
standard	2.2 - 2.4	21	51.2
above standard	2.5 - 2.8	10	24.4
Cosmetic Condition			
lower	2.0 - 2.4	20	48.8
upper	2.5 - 3.0	21	51.2
Structural Condition			
lower	1.6 - 2.1	24	58.5
upper	2.2 - 2.7	17	41.5

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

Table 2

A Comparison of Achievement Scale Score Means and Percentile Ranks on the Subtest of the Test of Academic Proficiency for Grade 11 During School Year 1991-92 and Building Condition Ratings

OVERALL	BUILDING		CONDITION			
	SUBSTANDARD N=10		STANDARD N=21		ABOVE STANDARD N=10	
	\bar{X}	PR	\bar{X}	PR	\bar{X}	PR
<u>Achievement:</u>						
Reading Comprehension	185	47	185	47	188	51
Mathematics	179	43	180	45	181	47
Written exp	191	57	186	51	193	59
Sources	189	48	191	50	193	52
Basic Composite	186	49	186	49	189	53
Soc Studies	190	48	190	48	192	51
Science	190	50	193	55	193	55
Complete Composite	187	47	188	49	190	52

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.

A comparison of the scale score means of substandard buildings and above standard buildings showed an increase in the scores on every subtest and a resulting complete composite score increase from 187 to 190. The comparison among the three building categories showed a steady increase in mathematics, sources, science and complete composite scores. It showed no change between substandard buildings and standard buildings in reading comprehension, basic composite and social studies; and it showed a decline in written expression from substandard buildings to standard buildings. There was an increase in scores from standard to above standard buildings in all categories but science, where the mean scale score remained the same. No building had the additional science laboratory facilities needed to rate it as above standard, which might have affected student achievement on the science subtest as it was compared to the overall building condition.

Because percentile ranks are often used for comparison purposes, Table 2 also provides the percentile rank associated with each adjusted scale score mean. The largest increase in percentile rank from substandard buildings to above standard buildings was five percentile points. That occurred in the science subtest and in the complete composite. As was the case with the scale score means, the percentile rank either remained the same or increased,

resulting in overall gain. The exception was in the percentile rank on written expression, which actually decreased from substandard (57%ile) to standard buildings (51%ile) and then increased from standard (51%ile) to above standard buildings (59%ile), resulting in a net gain of two percentile points.

Achievement and Cosmetic Building Condition

Ten questions on the Commonwealth Assessment of Physical Environment (CAPE) addressed cosmetic conditions. They targeted interior and exterior paint, grounds, graffiti, and floor maintenance. These areas were represented in the model design as building conditions which would affect student achievement and student behavior indirectly through student attitude. The schools were divided into lower- or upper-scoring schools based on their responses to the cosmetic items.

The scale score means for the Test of Academic Proficiency were adjusted for socioeconomic status and then compared for the two groups (Table 3). In every subtest except social studies, the mean scale scores were higher in the upper group of buildings. The differences between the groups ranged from a low of one in basic composite to a high

Table 3

A Comparison of Achievement Scale Score Means and Percentile Ranks on the Subtests of the Test of Academic Proficiency for Grade 11 During School Year 1991-92 with Cosmetic Building Condition Ratings

COSMETIC	BUILDING		CONDITION	
	LOWER SCORES N=20		UPPER SCORES N=21	
	\bar{X}	PR	\bar{X}	PR
<u>Achievement:</u>				
Reading Comprehension	185	47	187	50
Mathematics	179	43	181	47
Written exp	188	54	190	56
Sources	190	49	192	51
Basic Composite	186	49	187	50
Soc Studies	191	50	190	48
Science	191	52	193	55
Complete Composite	187	47	189	50

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.

of two in every other subtest, except the previously noted social studies.

A comparison of percentile ranks is also presented in Table 3. The percentile rankings were derived from the adjusted scale score means. The highest percentile rank change was four points in mathematics. Social studies was the only subtest in which the lower group (50%ile) had a higher mean than the upper group (48%ile). The complete composite, science, and reading comprehension means were separated by three percentile ranks.

Achievement and Structural Building Condition

Sixteen questions on the Commonwealth Assessment of Physical Environment addressed structural conditions, which included windows, heat, air conditioning, acoustics, lighting, wall color, building age, density or crowding, and science lab quality. These areas were represented in the model design as building conditions which would affect student achievement and student behavior directly. Each area was chosen because it had been explored for its possible impact on production in business or learning in education. Table 4 contains the results of analysis of adjusted achievement scale score means between the schools with lower structural condition scores and those with upper

Table 4

A Comparison of Achievement Scale Score Means and Percentile Ranks on the Subtests of the Test of Academic Proficiency for Grade 11 During School Year 1991-92 and Structural Building Condition Ratings

STRUCTURAL	BUILDING		CONDITION	
	LOWER SCORES N=24		UPPER SCORES N=17	
	\bar{X}	PR	\bar{X}	PR
<u>Achievement:</u>				
Reading Comprehension	186	49	185	47
Mathematics	180	45	180	45
Written Exp	189	55	190	56
Sources	191	50	191	50
Basic Composite	187	50	186	49
Soc Studies	191	50	190	48
Science	193	55	192	53
Complete Composite	189	50	188	49

Note. The scale score means have been adjusted for socioeconomic status. The percentile ranks have been derived from scale score means which have been adjusted for socioeconomic status.

structural condition scores. Differences between groups were small, no more than one point and not consistent in favoring one or the other group.

Percentile rank comparisons of achievement scale score means of subtests between the structural building condition lower and upper groups, also contained in Table 4, revealed a difference of no more than two percentile points in any subtest. Five subtests showed upper group means smaller than lower group means, two subtests showed equal means, and only written expression showed a slight increase of one percentile point.

Behavior and Building Condition

Three behavior factors were adjusted for socioeconomic status and then utilized for comparison across building conditions. Suspensions, expulsions, and violence/substance abuse incidents were gathered for the 1991-92 school year and compared to the student population to arrive at incident per student ratios. For example a school with a population of 300 students and 45 expulsions would have a .15 incident per student ratio; that ratio translates to 15 incidents per 100 students. These ratios were then compared across substandard, standard, and above standard building

conditions (Table 5). Suspensions and violence/substance abuse ratios were higher as the building condition improved. Expulsions ranged from .004 -- .4 expulsions per 100 students or four expulsions per 1000 students -- in substandard group to .002 in the standard group and then to .005 in the above standard group. The results indicated more disciplinary incidents were identified in higher quality buildings. This conflicted with the results of Cramer (1979).

To determine if cosmetic or structural subgroups provided different information, means were compared for lower and upper scoring groups in each subgroup.

The average behavior ratio scores for suspension, expulsion and violence/substance abuse were compared between the lower and upper scoring groups on the cosmetic items (Table 6). The group with higher cosmetic ratings also had higher ratios of incidents per student on all three behavior factors. Student disciplinary actions were more frequent in cosmetically better schools. The model design represented this as an indirect effect through attitude.

The average behavior ratio scores for suspension, expulsion, and violence/substance abuse were compared for lower- and upper-scoring schools in the structural items (Table 7). The resulting average ratios indicated more student disciplinary actions in areas of violence/substance

Table 5

A Comparison of Behavior/Student Ratios and Building Condition Ratings

	BUILDING	CONDITION	
	SUBSTANDARD	STANDARD	ABOVE STANDARD
	N=10	N=20	N=10
<u>BEHAVIOR:</u>			
SUSPENSIONS	.339	.746	.760
EXPULSIONS	.004	.002	.005
VIOLENCE/ SUBSTANCE ABUSE	.057	.092	.111

Note. The behavior/student ratios have been adjusted for socioeconomic status.

Table 6

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

COSMETIC	BUILDING	CONDITION
	LOWER SCORES	UPPER SCORES
	N=19	N=21
<u>Behavior:</u>		
Suspensions	.551	.736
Expulsions	.003	.004
Violence/ Substance Abuse	.061 (p=.03)	.113 (p=.03)

Note. The behavior/student ratios have been adjusted for socioeconomic status.

Table 7

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

STRUCTURAL	BUILDING	CONDITION
	LOWER SCORES	UPPER SCORES
	N=23	N=17
<u>Behavior:</u>		
Suspensions	.653	.641
Expulsions	.003	.004
Violence/ Substance Abuse	.072 (p=.10)	.110 (p=.10)

Note. The behavior/student ratios have been adjusted for socioeconomic status.

abuse incidents or actions resulting in expulsion occurred in better structural facilities. The model design represented this as a direct effect of building condition.

A regression analysis with the violence/substance abuse ratio regressed on building condition indicated a positive correlation ($r=.32$). A linear relationship existed between building condition and violence/substance abuse incident ratio with an unstandardized partial regression coefficient of .02 ($p=.04$). The variance in building condition accounted for over ten percent of the variance in violence/substance abuse incident ratios.

Correlations among the three behavior indicators and the three building condition categories identified a higher correlation among overall building condition, structural building condition, and cosmetic building condition, and the behavior factor of violence/substance abuse (Table 8).

Science Equipment and Science Achievement

Two items on the Commonwealth Assessment of Physical Environment were directed toward science lab adequacy. The first question, item 18, assessed which facilities were available and functioning in the science lab rooms. The choices were water, gas, sinks, and electricity. If all four facilities were available and functional, the science

Table 8

Pearson's Correlation Coefficient Between the Three Behavior Ratios -- Expulsions, Suspensions, Violence/Substance Abuse Incidents per Student -- and the Three Building Condition Ratings -- Building Condition, Cosmetic Condition, and Structural Condition

	BUILDING CONDITION		
	Overall N = 42	Cosmetic N = 42	Structural N = 42
Expulsions	-.0181	-.0104	.009
Suspensions	.1865	.1128	.1223
Violence/ Substance Abuse	.3167	.3668	.1677

lab was considered standard; if any of those facilities were unavailable or nonfunctional, the science lab was considered substandard. The adjusted scale score means for the science achievement subtest of the Test of Academic Proficiency were compared for schools with substandard and standard ratings (Table 9). The schools lacking at least one facility (N=10) had a mean scale score of 189 and the schools possessing all facilities (N=31) had a mean scale score of 194. This adjusted scale score difference of 5 points translated into a percentile rank difference of seven percentile points.

The second science-related item on the Commonwealth Assessment of Physical Environment, item 19, asked how long ago science equipment was updated to current standards. The choices were: over ten years ago (N=14), between five and ten years ago (N=16), and fewer than five years ago (N=11). The adjusted scale score mean for the science subtest of the Test of Academic Proficiency for each of these response groups was calculated (Table 10). The difference among the three groups was one mean scale score point. The mean scale score for the lower two groups was 192, and the mean scale score for the upper group was 193, which translated into a difference of two percentile ranks.

Table 9

A Comparison of Science Lab Equipment Availability and Science Subtest Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During School Year 1991-92

(SURVEY ITEM 18: PLEASE INDICATE WHICH UTILITIES OR EQUIPMENT ARE AVAILABLE AND IN USEABLE CONDITION IN THE SCIENCE LABS - GAS, WATER, SINKS, ELECTRICITY)

	<u>LACKING AT</u>	<u>POSSESSING</u>
	<u>LEAST ONE</u>	<u>ALL</u>
	N=10	N=31
<hr/>		
<u>Science Achievement</u>		
Scale Score Means	189	194
Percentile Rank	49	56

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 10

A Comparison of Science Lab Equipment Age with Science Scale Score Means and Percentile Ranks on the Test of Academic Proficiency for Grade 11 During the 1991-92 School Year

SURVEY ITEM 19: HOW LONG AGO WAS SCIENCE EQUIPMENT UPDATED TO CURRENT STANDARDS?

	<u>UPDATED OVER 10 YEARS AGO</u>	<u>UPDATED BETWEEN 5 AND 10 YEARS AGO</u>	<u>UPDATED LESS THAN 5 YEARS AGO</u>
	N=14	N=16	N=11
<u>Science Achievement</u>			
Scale Score Means	192	192	193
Percentile Ranks	53	53	55

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.

Individual Building Condition Factors and Achievement

In order to investigate the importance of each individual building condition factor, the individual Commonwealth Assessment of Physical Environment item responses were compared across the mean scale scores of complete composite on the Test of Academic Proficiency. The first fifteen items, the number in each group, and the associated adjusted mean scale score are listed in Table 11. Condition one is considered substandard, condition two standard, and condition three above standard.

Building Age

Building age was represented in each condition group. Although there was no difference in the scale scores between the first two groups, covering buildings 20 years old and older, there was a difference of three scale score points between all buildings 20 years old or older and younger buildings. Younger buildings had a composite mean scale score of 191, while the other buildings had a composite mean scale score of 188. This supported findings of McGuffey and Brown (1978) and Chan (1979) regarding the impact of building age on student achievement

Table 11

A Comparison of Complete Composite Scale Score Means on the Test of Academic Proficiency for Grade 11 During the 1991-92 School Year and Commonwealth Assessment of Physical Environment (CAPE) Responses for Items 1 through 15

Item on CAPE	N	SUBSTANDARD	N	STANDARD	N	ABOVE STANDARD
1 Building Age	5	188	31	188	5	191
2 Windows	0	---	3	186	37	189
3 Floors	1	198	39	188	1	184
4 Heat	19	189	11	186	11	189
5 Air Conditioning	26	187	8	190	7	192
6 Interior Paint	1	178	5	189	35	189
7 Interior Paint Cycle	12	189	4	188	24	188
8 Exterior Paint	12	188	7	187	22	189
9 Exterior Paint Cycle	18	187	5	186	18	190
10 Roof	7	189	12	190	22	187
11 Adjacent Facility	14	185	26	190	1	190
12 Swept	0	---	0	---	41	188
13 Mopped	5	188	10	192	26	187
14 Graffiti	0	---	16	186	25	190
15 Graffiti Removal	2	193	3	189	36	188

Note. Complete questions can be found in Appendix H.

Windows

All schools had instructional areas with some windowed rooms, and most (N=37) had instructional areas with all windowed rooms. When the scale score means were compared between the two groups, the group in which all instructional classrooms had windows had a three point higher mean.

Floors

The item which addressed floors asked if the floors were wood, condition one, tile or terrazzo, condition two, or carpet, condition three. All but two schools had tile or terrazzo floors; of the remaining two schools, one had wood floors and the other had carpet. The mean scale score for condition one was 198, for condition two was 188, and for condition three was 184. Because all but two schools were represented by condition two, this information was not useful.

Heat

Heat conditions were well represented in each category. The mean scale score for condition one, uneven heat/unable to control in each room, was 189 (N=19); the mean scale score for condition two, even heat/unable to control in each room, was 186 (N=11); and the mean scale score for condition three, even heat/able to control in each room, was 189

(N=11). The reported mean scale scores provided no pattern which could be related to heat condition.

Air Conditioning

The CAPE surveyed schools to determine the level of air conditioning in instructional spaces. The mean scale score for condition one, no air conditioning in the facility, was 187 (N=26); the mean scale score for condition two, air conditioning in some instructional spaces, or air conditioning in all instructional spaces, but not well regulated, was 190 (N=8); and the mean scale score for condition three, air conditioning in all instructional spaces which can be well regulated, was 192 (N=7). As the air conditioning level or quality increased, the mean scale scores were also higher. The difference between the lowest and highest condition mean scale scores was five points, which translated into eight percentile ranks. This supported the findings on Chan (1980) regarding the impact of air conditioning on student achievement.

Interior Paint

Two items investigated the quality of interior paint. The first item, number 6, asked when the interior walls in classroom spaces were last painted. One school indicated walls had not been painted within the last 15 years. Five

schools indicated walls had been painted between eight and fifteen years ago. Thirty-five schools indicated they had painted the walls less than eight years ago. The mean scale scores were 189 for schools in the last two groups, but the school which had not been painted within the last 15 years had a scale score of 178.

The second item, number 7, asked if there was a regularly scheduled painting cycle for interior walls. There was only one scale score difference among the three categories.

Exterior Paint

The two items on the CAPE which addressed exterior paint looked at when and on what cycle exterior painting was accomplished. Item number 8 asked when the exterior areas were last painted. The mean scale score for those who painted over seven years ago (N=12) was 188; the mean scale score for those who painted between four and seven years ago (N=7) was 187; and the mean scale score for those who painted within the past four years (N=22) was 189. There were only two points between any of the groups and no consistent increasing or decreasing pattern.

Item 9 looked at the paint cycle for exterior surfaces. The schools (N=18) with no paint cycle had a mean scale score of 187; the schools (N=5) with an over seven year

cycle had a mean scale score of 186; and the schools (N=18) with a seven or fewer year cycle had a mean scale score of 190. Four scale score points was the range with a shorter cycle having higher scale scores.

Roofs

Item ten on the CAPE looked at ceiling condition as an indicator of water damage to the roof. Seven schools, with a scale score mean of 189, indicated their ceilings were deteriorating from water damage. Twelve schools, with a scale score mean of 190, indicated their ceilings showed current signs of water damage. The remaining 22 schools, with a scale score mean of 187, indicated ceilings showed no current signs of water damage but might have a few old water spots. Mean scale score differences followed no consistent pattern.

Adjacent Facilities

Item 11 listed typical exterior facilities associated with schools and indicative of surrounding terrain and space. Those facilities included football, baseball, soccer and softball fields; tennis courts; and a swimming pool. Two or fewer facilities were associated with condition one (N=14) and had a mean scale score of 185; three or four facilities were associated with condition two (N=26) and had

a mean scale score of 190; and more than four facilities were associated with condition three (N=1) and had a scale score of 190. A net scale score difference between condition one and conditions two and three was five points with more facilities associated with the higher score.

Floor Maintenance

Two items were related to floor maintenance; one asked how often floors were swept, and the other asked how often floors were mopped. All schools indicated their floors were swept daily or more frequently, which removed this item from comparison. The mop cycle was less uniform. The five schools which indicated their floors were mopped annually had mean scale score of 188; the ten schools which indicated their floors were mopped monthly had a mean scale score of 192; and the 26 schools which indicated their floors were mopped at least weekly had a mean scale score of 187. The difference was not consistently higher or lower but had a range of five points.

Graffiti

Item 14 listed eight areas where graffiti might exist. No schools indicated graffiti in more than three areas. Sixteen schools indicated graffiti was found in between one and three areas and had an associated mean scale score of

186. The remaining 25 schools had no graffiti and an associated mean scale score of 190. There was a four point difference between the scale scores of schools with some and no graffiti.

Item 15 looked at how long it took to remove graffiti. Two schools indicated graffiti removal was delayed until summer, sixteen schools indicated removal was done within a month, and thirty-six schools indicated removal was done within a week or never occurred. Scale scores were highest (SS=193) for schools with the most delayed removal and lowest (SS=188) for schools with the most prompt removal.

Locker Condition

Item 16 (Table 12) assessed the condition of lockers. Eight schools had lockers which were either not functional or not in good repair; their mean scale score was 185. Four schools had at least three-fourths of the lockers in good repair; their mean scale score was 187. The remaining 28 schools had more than three-fourths of the lockers in good repair; their mean scale score was 189. As the locker quality improved, the associated mean scale score was also higher.

Table 12

A Comparison of Complete Composite Scale Score Means on the Test of Academic Proficiency for Grade 11 During the 1991-92 School Year and Commonwealth Assessment of Physical Environment (CAPE) Responses for Items 16 through 27

Item on CAPE	N	SUBSTANDARD	N	STANDARD	N	ABOVE STANDARD
16 Locker Cond.	8	185	4	187	28	189
17 Ceilings	2	188	18	188	20	189
18 Lab Equip.	10	185	31	189	0	---
19 Lab Age	14	187	16	189	11	189
20 Lighting	5	189	10	192	25	186
21 Desks	1	183	25	188	15	190
22 Grounds	4	194	23	187	14	189
23 Wall Color	0	---	20	188	21	189
24 Noise	10	187	4	189	27	189
25 Opinion	9	189	19	186	13	191
26 Density	6	186	3	193	22	189
27 Acreage	23	189	7	187	6	189

Note. Complete questions can be found in Appendix H.

Acoustics

Acoustics was addressed by item 17, which asked what type of material was used for interior ceilings. Condition one was related to wood or open beams and accounted for only two schools with a mean scale score of 188. Condition two was related to plaster or acoustical tiles in at least three-fourths of the instructional spaces and accounted for eighteen of the schools with a mean scale score of 188. Condition three was related to acoustical tiles throughout the instructional spaces and accounted for twenty of the schools with a mean score of 189. Acoustical ceiling condition accounted for no more than one point of difference in the mean scale score.

Science Laboratories

Items 18 and 19 regarded information about the quality and age of science laboratories. This topic was investigated earlier, beginning on page 57, as a major area.

Lighting

Item 20 grouped schools by type of lighting - incandescent or fluorescent, hot or cold. The highest mean scale score (192) was in the group of schools (N=10) with hot fluorescent lighting. The lowest mean scale score (186) was in the group of schools (N=25) with cold fluorescent

lighting. The group of schools (N=5) with incandescent lighting had a mean scale score of 189.

Furniture

The condition of classroom furniture was assessed by item 21. One school had a mean scale score of 183 and furniture which was facially scarred or functionally damaged. Twenty-five schools had a mean scale score of 188 and furniture which might have some minor scarring. The remaining 15 schools had a mean scale score of 190 and attractive, functionally sound furniture. Improved furniture condition was related to higher mean scale scores.

Grounds

Item 22 considered the condition of school grounds, with one indicating no landscaping, two indicating adequate landscaping, and three indicating attractive landscaping. Condition one (N=4) had a mean scale score of 194; condition two (N=23) had a mean scale score of 187; and condition three (N=14) had a mean scale score of 189. No pattern was apparent.

Wall Color

Item 23 revealed schools with instructional spaces painted either white (N= 20) or in pastel colors (N=21).

Schools with white walls had a mean scale score of 188, while schools with pastel walls had a mean scale score of 189.

Noise

Whether or not the school was located in a noisy area was the topic in item 24. Condition one was assigned to schools near noisy areas without noise reduction accommodations. Condition two was assigned to schools near noisy areas with noise reduction accommodations. Condition three was assigned to schools isolated from noise. The mean score for schools in condition one (N = 10) was 187; the mean score for schools in condition two (N=4) and condition three (N=27) was 189.

Density

Student density in square feet per student was determined by item 26. Condition one (N=6) had less than 110 square feet per student and an associated mean scale score of 186; condition two (N=3) had between 110 and 145 square feet per student and an associated mean scale score of 193; and condition three (N=22) had 145 square feet or more per student and an associated mean scale score of 189. No pattern was apparent.

Acreage

Item 27 elicited the acreage for each school. Condition one was 15 or fewer acres (N=23) and had an associated scale score of 189; condition two was between 15 and 30 acres (N=7) and had an associated scale score of 187; and condition three was over 30 acres (N=6) and had an associated scale score of 189. There was very little difference and no pattern between groups.

Building Age and Building Condition

Regression analysis considered the relationship between building age and building condition, using the original seven categories of age which approximated decades. Building condition was regressed on building age. The building condition factor came from the average value on the CAPE, which ranged from 1.9 to 2.8. The resulting unstandardized regression coefficient was .08 ($p=.003$). The adjusted R squared was 0.1835, indicating approximately 18% of the variance in building condition was associated with variance in age of building.

Responder Comments

The Commonwealth Assessment of Physical Environment provided an area of free response for those completing the assessment instrument. The responder was directed to comment on personal feelings regarding the possible relationship between building condition and student behavior or student achievement.

Thirteen of the forty-three returned instruments included responses (Appendix K). All responses reflected the opinion that positive relationship between building condition and student achievement or student behavior existed. Many commented on the behavior of students as it related to building condition, suggesting that a better building solicited better behavior. One superintendent related an incident from an third grade elementary student who arrived at a newly remodeled school. His first comment upon departing the bus was, "Now my school looks like everyone else's." Several comments suggested the relationships among self-esteem, school pride, and building condition.

CHAPTER FIVE

This chapter includes a summary, conclusions, and discussion of the study. It concludes with recommendations for further study.

Summary

The entire population of small, rural high schools in Virginia was used to investigate the relationship between building condition and student achievement and student behavior through analysis of covariance, regression, and correlation analysis. The building condition rating was derived from the Commonwealth Assessment of Physical Environment and subdivided into cosmetic and structural condition ratings. Student achievement was represented by mean scale scores from the subtests of the Test of Academic Proficiency for grade 11 during the 1991-1992 school year. The science subtest mean scale scores were compared across the three building rating responses to the science quality questions on the Commonwealth Assessment of Physical Environment. All achievement scale scores were adjusted for socioeconomic status through the use of free and reduced lunch student qualification information; the percent of the population not qualified for free or reduced lunch was used

as the covariate. Student behavior was represented by incidents per student ratios in expulsions, suspensions, and violence/substance abuse incidents. The adjusted mean scale scores in achievement and the behavior ratios were compared across the three levels of building condition and between the two levels of cosmetic and structural conditions.

Conclusions

1. Student achievement was found to be higher in those buildings with higher quality ratings.
2. When building condition was subdivided into structural and cosmetic conditions and student achievement was compared across the levels of the conditions, higher student achievement mean scale scores were found in schools with higher quality cosmetic building condition ratings. Student achievement mean scale scores were almost identical for both lower and upper scoring schools on structural ratings. Student achievement appeared to be more directly related to cosmetic factors.
3. Science achievement of students was higher in buildings with better quality science facilities than in those with lower quality science facilities.

4. A review of individual factors on the Commonwealth Assessment of Physical Environment revealed a relationship between student achievement and several factors. Because the factors may have been related to local available money, a Pearson's correlation coefficient was calculated between building condition and Local Composite Index. The resulting coefficient was .136, indicating a very low correlation between the two factors. A Pearson's correlation coefficient was also calculated between building condition and the socioeconomic proxy variable regarding free lunch, which has been used throughout the study. That correlation coefficient was .14, which also indicated a very low correlation. These low correlations minimized any consideration of varying economic conditions as a factor in the following results, which were already adjusted for socioeconomic status.

-Higher achievement was associated with schools with at least some air conditioning in instructional spaces.

-Higher achievement was associated with schools with less graffiti.

-Higher achievement was associated with schools with better locker conditions.

-Higher achievement was associated with schools

with better science laboratory equipment.

-Higher achievement was associated with schools with classroom furniture in better condition.

-Higher achievement was associated with schools with pastel painted walls instead of white walls in instructional areas.

-Higher achievement was associated with schools with less noisy external environments.

5. Building condition and student behavior factors were related. The schools with higher quality buildings reported higher incidents per student ratios of violence/substance abuse, suspensions, and expulsions.

Discussion

This study provided support for a relationship between building condition and student achievement and student behavior. The scale score means in achievement subtests between substandard and above standard building condition categories differed by up to four points, which accounted for up to five percentile ranks. The scale score means for the complete composite score on the achievement test compared across the three building condition categories differed by as many as seven points, accounting for up to eleven percentile ranks. This number, though relatively

small, is important when one considers, as McGuffey (1978) indicated, that in most studies less than 60 percent of student achievement test score variance is explained by combinations of all variables. The majority of explained variance in student achievement test scores is associated with socioeconomic status. When that factor is controlled and there is a difference of five to eleven percentile ranks associated with building condition, it would seem that school personnel should consider addressing the issue of building condition. Additionally, when a school with a mean scale score at the 50th percentile increases its mean scale score five percentile ranks, it has shown a ten percent increase. If it moves eleven percentile ranks, it has increased over twenty percent. From this perspective, the resulting potential achievement gains become more educationally significant.

Building maintenance is a costly part of the total school budget. If the factors which were identified as showing mean scale score achievement differences across building condition categories were extremely costly structural factors, then the justification for change based on a possible percentile rank difference of up to eleven points might be questionable. However, if the factors which were identified were cosmetic factors, with a lower estimated cost, the value for the dollar would be more

reasonable. The factors which were identified in this study as associated with the greatest amount of difference in achievement scale score means were air conditioning, absence of graffiti, locker condition, science laboratory equipment condition, classroom furniture condition, wall color, and acoustical level.

Air conditioning is a structural factor which is associated with better student achievement score means. Many of the schools in this population were located in or around the mountainous regions of the western part of Virginia, where it is commonly felt that air conditioning is unnecessary; this study provided support for air conditioning even in those areas. Although air conditioning is expensive, it is important to student achievement and should be considered in any building condition improvement plan.

The remainder of the factors were cosmetic and relatively inexpensive to incorporate in an improvement plan. Painting in a pastel color is no more expensive than painting in white. Locker and classroom furniture conditions are minor maintenance expenses when not deferred. Immediate attention to graffiti and discouragement of repeated graffiti is also inexpensive. Schools located in noisy areas need not move, but only implement noise reduction devices to provide a more desirable physical

environment. Even in the science area, the availability of gas, electricity, water, and sinks was more important to test scores than was laboratory age, which could be more costly to update.

The issue of improved building condition is not if it should be done, but rather if it should be done when funds are limited. The educational benefit for fiscal output must be considered. A new building with its associated cost is not necessary; neither is a remodeled building which makes major structural changes to windows, heating systems, and floor surfaces. [What is necessary is the addition of air conditioning and the attention to locker and furniture maintenance, graffiti removal, and wall color.] ✓

In addition to the issue of cost efficiency, there is the issue of educational value. If educational personnel can make a difference in the achievement of students and choose not to take the necessary steps, one wonders what message is being sent. Only a few factors can be controlled to any extent by educational personnel. Administrators can select and maintain quality teachers, secure appropriate educational materials, and provide a positive learning environment. This study addressed a positive learning environment.

Most studies have investigated the relationship between student achievement and building condition, but very few

studies have looked at student behavior and building condition. Student behavior has emerged as an area of increasing concern during the past few years as young people have become more violent, more associated with gangs and more exposed to negative adult behavior. There is a greater need to minimize negative student behavior because of the safety of other students. While the current study found a significant relationship between student behavior and building condition, it did not clarify the relationship. The concern over what was being measured by the behavior factor overshadowed the results. However, if behavior quality can be affected by building condition, then, because of the potentially violent nature of student misbehavior, it is important not to disregard any possible avenue to effect change.

Building condition is more than a static condition. It is a physical representation of a public message about the value of education. If students perceive education as something to be done in a poor quality facility, they may also perceive it to be of less value. Coe (1989) found that rural schools in Virginia had lower achievement scores and lower socioeconomic conditions. To encourage academic excellence and potential economic success, schools must represent a better way of life -- a promise of the future. Schools should reflect the environment of success.

Study Concerns

It is important to look beyond the numerical comparisons of scale score achievement means to determine their significance. For example, conclusions cannot be realistically drawn from some of the data due to problems which were revealed in the Commonwealth Assessment of Physical Environment.

Problems Related to Commonwealth Assessment of Physical Environment

Although the CAPE was piloted and revised before use with the population in this study, the following concerns were revealed as the study progressed:

1. Question four, which addressed heat quality, lacked clarity for discriminating between different heat concerns. The determination of uneven or even heat was not defined clearly enough to eliminate a variety of interpretations.
2. Question five, which addressed air conditioning, was successful in separating no air conditioning from some air conditioning, but provided no additional information. Choice b on the instrument covered air conditioning in as few as one classroom or as many as all classrooms. The determination of whether or not

the air conditioning was well regulated was subject to interpretation.

3. Questions seven and nine sought information regarding the paint cycle. Although this information was important, it added little to a study which addressed current condition and already had information regarding the recency of interior and exterior painting. For example, if the interior walls were painted last year and on an as needed basis, the lack of a specific paint cycle was unrelated to current building condition.
4. Question eleven, regarding the adjacent exterior facilities, provided football stadium as a choice, which left some responders confused about what to mark if they had a football field but not a stadium.
5. Question twenty, regarding type of lighting, was unclear because of the lack of understanding of the difference between hot and cold fluorescent lighting. The only appropriate use of this question was to discriminate between those who had fluorescent lighting and those who had incandescent lighting.

Although the previously noted areas of concern need to be addressed before the assessment instrument is used in further studies, it did effectively divide schools into three groups -- substandard, standard, and above standard --

based on building condition. Those groups, when used to compare achievement scale score means, provided evidence of a relationship between building condition and student achievement.

Problems Related to the Behavior, Achievement and Free/Reduced Lunch Information Instrument

Although the survey used to secure achievement, free lunch, and behavior information was piloted, the following concerns emerged as the population responses were reviewed:

1. Item one requested scale scores for the achievement information. Although this appeared to be clear, three schools responded with percentile information. This information was converted, using the test manual, to the requested scale scores.
2. Item three was of the greatest concern. This item asked for the number of suspensions and expulsions. The number of expulsions was clearly the number of students who had been expelled. The number of suspensions, however, could have been the number of students who had been suspended or the total number of days of suspension for all students. The confusion invalidated any comparisons among schools on the suspension ratios. Conclusions should be drawn from the data on expulsions or from information in item four

-- the number of incidents of crime and violence as reported to the division for the state report.

Although the survey instrument should be revised prior to further use, it did effectively collect information regarding student incidents of expulsion and crime and violence.

Population Size Limitations

Because of the limited number of schools in the population and their similarities, some items in the assessment instrument had very little or no variance. For example, the question regarding how often the floors were swept was answered as daily by every school. There was no variance, which eliminated further analysis of the responses to this question. Other question responses, although not completely uniform, varied only slightly. Those included responses to questions about the number of classrooms with windows, the type of floor, the interior paint cycle, and the graffiti removal cycle. Almost all schools had windows in the majority of their classrooms, so an investigation of the effects of natural lighting could not be done. A larger population might have allowed more variance and provided more information for investigation.

Measurement of Behavior Factor Concerns

The measurement of behavior factor concerns are two-fold. First, there were very few incidents of misbehavior, as identified in numbers of expulsions or incidents of crime and violence, which made conclusions less definitive. Small schools usually have fewer discipline problems than large schools (Gottfredson, 1985), and rural areas also may have fewer discipline problems than urban and suburban areas, so the combination of small and rural high schools could be expected to report fewer discipline incidents. That portion of the study might have produced more significant results if a different population and a larger population had been used. Perhaps a regional or national study of small, rural high schools would have provided more variance. More variance might also have been found in urban or suburban school populations.

The second and most important question regarding behavior addressed what the factors actually represented. Whether the reported incidents of suspension, expulsion, and violence/substance abuse represented incidents of misbehavior or incidents of behavior enforcement is a matter to be considered. Because larger students-per-incident ratios were found in better quality buildings, one conclusion might be that students misbehave more in better buildings. This conclusion could be supported by the data

provided in this study, but is not consistent with expected outcomes.

An alternative inference drawn from data which indicates higher behavior-incident ratios in better buildings is that enforcement is higher, because of a higher level of expectation, in buildings which also maintain higher quality physical conditions. This alternative inference is more consistent with expected outcomes.

Another alternative explanation drawn from these data is that record keeping is more accurate in better buildings -- thus reporting a larger number of incidents. This alternative explanation would require the data to be completely disregarded.

Because the results can be interpreted in three incompatible ways, behavior needs to be assessed in another manner or additional information needs to be provided. It may be necessary to survey teachers and students regarding the level of behavior of students rather than surveying the schools regarding the level of enforcement of behavior. These two areas may not provide parallel results.

Alternative Explanations for the Conclusions

The results of this study indicate there is a positive relationship between building condition and student

achievement. The cosmetic factors appear to contribute more to that relationship than do the structural factors. If the way a school looks has a greater effect on achievement than those physical factors like light and heat, the relationship between achievement and building condition may be indirect instead of direct.

Returning to the design model, it is important to note student attitudes affect student achievement and student behavior. In the model, building condition affects student attitude. An alternative explanation is that student attitude affects building cosmetic condition through the actions of students who may damage the building or add graffiti. This would indicate a need to address student attitude first to effect a change in the building condition. The model, conversely, supports the need to improve the cosmetic building condition in order to improve student attitude and subsequent achievement and behavior. A study which assesses student attitude in addition to cosmetic building condition might be able to provide clarification.

Also, the study supported a positive relationship between student science achievement and the presence of basic science laboratory facilities. This could be a direct relationship because of the increased hands-on experiences in the science program. It could also be an indirect relationship explained by the perceived importance of

science associated with the existence of the laboratory equipment. That perceived importance could affect teacher and student attitudes and interest. No question addressed the level of use of equipment, so the nature of the relationship was not explained. A study which included data on laboratory use might provide greater insight into the nature of the relationship.

Recommendations for Further Study

1. Using a revised Commonwealth Assessment of Physical Environment and a clarified data-gathering instrument, investigate the relationship between building condition and student achievement and student behavior in urban schools. Because there are more incidents of misbehavior in urban schools, there is the possibility of greater variance in the factors. Additionally, the study of urban students, when compared to the current study of rural students, might provide tentative generalizations to other school populations.
2. Because of the increased violence in schools, a study of the relationship between building condition and student behavior, using additional data to identify student behavior ratings, should be conducted. This study might need to include a survey of teachers,

parents, and students, regarding the level of violence and the level of discipline enforcement. The additional surveys might help clarify the meaning of the data. Any information which could provide suggestions for minimizing student incidents of violence and other misbehavior would be beneficial to school divisions.

3. Investigate the relationship between student and faculty attitude and building condition more directly in order to determine which factor is dependent on the other. If attitude is responsible for cosmetic building condition, then changing the attitude will be the first order of business. However, if building condition is responsible for attitude, then building condition needs to be the focus of improvements.
4. Use the Council of Educational Facilities Planners International's (CEFPI'S) Guide for School Facility Appraisal and the Commonwealth Assessment of Physical Environment (CAPE) on a designated population to determine how effective the CAPE is as an instrument for local building condition assessment. If it correlates highly with the other accepted assessment instrument, its brevity and simplicity may allow it to be an effective substitute for the CEFPI assessment instrument.

5. Revise the CAPE and apply it to an elementary school population to investigate the relationship between building condition and student achievement and behavior in a younger population. Because the students are younger and their attitudes about education may be more positive, or at least less negative, the impact of building condition on their behavior or achievement may be even more significant.
6. Identify a group of students who are moving from an older school to a newer or recently renovated building, and study student achievement scores and behavior before, immediately after, one year after, and three years after the move to determine if there is a long term effect on student achievement and behavior which occurs because of the changed building condition. An earlier study by Cramer (1976) compared student attitude and behavior among the students in an older dilapidated school, a new school, and a renovated school and found better student attitude in the renovated school and poorer behavior in the older dilapidated school. Lane (1991) indicated some schools showed a 20 percent improvement in test score the first year they were open as compared to the previous year in a different facility. Student behavior was not addressed. Neither study looked at whether or not the

increased achievement scores or improved behavior were sustained over a period of time. The suggested study would look at the same students over a period of time, which should provide more meaningful information regarding the longitudinal effects of improved building quality on student achievement and behavior.

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APPENDIX A

Schools in Study Population

SCHOOL NUMBER	NAME	N SR	N 9-12	N TOT	COUNTY
001.0530	TANGIERS	12	41	90	ACCOMACK
001.0580	CHINCOTEAGUE	37	179	319	ACCOMACK
008.0680	RIVERHEADS	94	426	426	AUGUSTA
009.0140	BATH COUNTY	32	186	259	BATH
011.0060	ROCKY GAP	38	160	421	BLAND
011.0230	BLAND	47	168	454	BLAND
014.0030	GARDEN	67	281	425	BUCHANAN
014.0360	WHITEWOOD	33	153	239	BUCHANAN
014.1000	COUNCIL	43	181	234	BUCHANAN
014.1020	HURLEY	68	361	361	BUCHANAN
023.0011	CRAIG COUNTY	36	186	249	CRAIG
025.0150	CUMBERLAND	86	338	421	CUMBERLAND
026.0120	HAYSI	92	392	493	DICKENSON
026.0840	ERVINTON	43	209	285	DICKENSON

SCHOOL NUMBER	NAME	N SR	N 9-12	N TOT	COUNTY
028.0010	ESSEX	97	461	603	ESSEX
035.0470	NARROWS	76	281	363	GILES
038.0710	MT ROGERS	12	41	90	GRAYSON
045.0220	HIGHLAND	25	99	166	HIGHLAND
046.0250	WINDSOR	83	372	508	ISLE OF WIGHT
049.0280	KING/QUEEN	58	236	328	KING & QUEEN
051.0010	LANCASTER	91	404	543	LANCASTER
052.0880	THOMAS WALKER	84	343	415	LEE
057.0190	MATHEWS	91	389	389	MATHEWS
059.0090	MIDDLESEX	67	295	411	MIDDLESEX
060.0290	SHAWSVILLE	47	297	566	MONTGOMERY
060.0650	AUBURN	48	279	477	MONTGOMERY
066.0040	NORTHUMBERLAND	71	379	379	NORTHUMBERLAND
069.0110	LURAY	99	441	554	PAGE
078.0230	RAPPAHANNOCK	59	286	366	RAPPAHANNOCK
079.0210	RAPPAHANNOCK	56	323	323	RICHMOND

SCHOOL		N	N	N	
NUMBER	NAME	SR	9-12	TOT	COUNTY
081.0642	NATURAL BRIDGE	50	195	348	ROCKBRIDGE
081.0680	ROCKBRIDGE	72	294	294	ROCKBRIDGE
083.0540	HONAKER	92	547	695	RUSSELL
083.0791	CASTLEWOOD	75	411	515	RUSSELL
084.0260	RYE COVE	70	302	392	SCOTT
084.0780	TWIN SPRINGS	72	305	382	SCOTT
085.0770	STRASBURG	90	356	447	SHENANDOAH
085.0790	STONEWALL J.	97	370	475	SHENADOAH
086.0460	CHILHOWIE	97	393	589	SMYTH
090.0010	SURRY COUNTY	55	290	493	SURRY
092.0930	POCAHONTAS	53	200	293	TAZEWELL
094.1060	HOLSTON	77	296	296	WASHINGTON
095.0120	WASH. & LEE	81	458	458	WESTMORELAND
096.0071	POUND	80	357	527	WISE
096.0710	APPALACHIA	63	307	399	WISE
096.0872	ST PAUL	35	143	191	WISE

SCHOOL		N	N	N	
NUMBER	NAME	SR	9-12	TOT	COUNTY
097.0202	RURAL RETREAT	75	340	434	WYTHE

APPENDIX B

Letter Accompanying CAPE Assessment Evaluation Instrument

Thank you for agreeing to use the enclosed facility condition assessment instrument to rate your school and for agreeing to evaluate the assessment instrument. I hope you will feel free to make any comments on the evaluation form concerning areas that have not been addressed in this assessment instrument or improvements that should be made.

The enclosed assessment instrument is being developed in an effort to assess building condition so a relationship between it and student achievement and behavior can be studied. Because the relationship involves those items in the building condition which are visible or directly impact the student physically, like lighting or climate control, some building issues are not addressed.

The assessment instrument (CAPE) will be sent to each of the superintendents in the Public School Systems in Virginia which have high schools with fewer than 100 enrolled seniors and are located in a rural area. The superintendents will be asked to assign a central office person to do the assessment, rather than assigning the task to the building administrator.

Again, I would like to thank you in advance for the time you took to use and then evaluate the assessment instrument. If you have any questions, please call me at Lynnhaven Middle School (496-6790) or at my home (431-0172).

Carol S. Cash

Doctoral Student

Virginia Tech University

APPENDIX C

CAPE ASSESSMENT EVALUATION INSTRUMENT

EVALUATION OF THE ASSESSMENT INSTRUMENT USED FOR DETERMINING THE STATUS OF PHYSICAL ENVIRONMENT (FACILITY CONDITION) IN SMALL, RURAL HIGH SCHOOLS IN VIRGINIA

Please rate the clarity of each of the twenty-eight questions on the Commonwealth Assessment of Physical Environment (CAPE) from 1 - 5. (1 = poor question clarity and 5 = very clear question). You are to rate each item by placing an x at the score you choose. If you would like to make a comment concerning any question, please do so in the space provided.

For example, if you think the question is poorly worded, place an X at 1 or 2. If you want to explain, you might comment "Question is unclear."

Question	Rating					Comment
	poor				good	
	1	2	3	4	5	
Example 1	X	_	_	_	_	too vague

Please rate each of the assessment items using the following scale:

Question	Rating					Comment
	poor				good	
	1	2	3	4	5	
1	_	_	_	_	_	_____
2	_	_	_	_	_	_____
3	_	_	_	_	_	_____
4	_	_	_	_	_	_____
5	_	_	_	_	_	_____
6	_	_	_	_	_	_____
7	_	_	_	_	_	_____
8	_	_	_	_	_	_____
9	_	_	_	_	_	_____
10	_	_	_	_	_	_____

11	_ _ _ _ _ _ _	_____
12	_ _ _ _ _ _ _	_____
13	_ _ _ _ _ _ _	_____
14	_ _ _ _ _ _ _	_____
15	_ _ _ _ _ _ _	_____
16	_ _ _ _ _ _ _	_____
17	_ _ _ _ _ _ _	_____
18	_ _ _ _ _ _ _	_____
19	_ _ _ _ _ _ _	_____
20	_ _ _ _ _ _ _	_____
21	_ _ _ _ _ _ _	_____
22	_ _ _ _ _ _ _	_____
23	_ _ _ _ _ _ _	_____
24	_ _ _ _ _ _ _	_____
25	_ _ _ _ _ _ _	_____
26	_ _ _ _ _ _ _	_____
27	_ _ _ _ _ _ _	_____
28	_ _ _ _ _ _ _	_____

Are there any areas that have been deleted or overlooked?
 yes _____ no _____

If yes, what areas? _____

Suggestions for improvement of the assessment instrument?

Thank you very much for taking the time to critique this assessment instrument.

Carol S. Cash
 Doctoral Student
 Virginia Tech University

APPENDIX D

Letter to Superintendent

3245 Clubhouse Rd.

Virginia Beach, VA 23452

November 14, 1992

1~, Superintendent

2~

3~

4~, 5~

Dear Superintendent,

I am currently doing research in cooperation with the Division of Educational Administration at Virginia Polytechnic Institute and State University. My research involves a study of the relationship between school facility condition and student behavior and achievement in Virginia's small, rural high schools.

The purpose of the study is to determine if there is a relationship among these variables. Data from this study may provide valuable information to divisions regarding conditions which affect student outcomes in achievement and behavior. With dwindling fiscal resources, research that might identify important target areas could be of valuable assistance.

The following schools in your division are among the 48 schools in Virginia which meet the criteria for small rural high schools:

6~

In order to complete this research, data on student achievement, behavior, free and reduced lunch recipients, and building condition will be needed for each of these schools. The names of the participating schools will be listed in the appendix; however, the individual schools will not be identified by school number, name or division in the body of the report. The intent of this report is not to compare schools, but rather to look at the targeted relationship while protecting the anonymity of each school's information and facility assessment.

I would appreciate your participation in the study and have included a post card for your use to indicate your willingness to be included and the name of the central office person who will be responsible for collection of data. Your total time commitment per school should be less than one hour, while the results could be valuable in future planning. If, however, you find you cannot participate in this study, the post card can be used to inform me of your decision.

I anticipate mailing the facility assessment instrument and data request form to each division's contact person by

mid-January and expect to complete the study in early spring. A copy of the results will be made available to you upon request at that time.

If you have questions or require clarification, please call me at Lynnhaven Middle School (804) 496-6790.

Thank you for your help in making this research a reality.

Sincerely,

Carol S. Cash
Doctoral Student
Virginia Tech

APPENDIX E

Post Card

Superintendent
Division No. _____

Ms. Carol S. Cash
3245 Clubhouse Rd.
Virginia Beach, VA 23452

Div. No. _____

YES, my division will participate and the
contact person is:

name _____

address _____

NO, my division will not participate.

APPENDIX F

Letter of Thanks and Instruction

December 15, 1992

2~

3~

4~

Dear 2~,

Thank you for your willingness to participate 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 a small rural high school for purposes of this study.

Please complete the Commonwealth Assessment of Physical Environment and provide the information requested on the enclosed Behavior, Achievement, and Free/Reduced Lunch Information form. Then return both items in the preaddressed/stamped envelope. Should you need clarification on any items, please contact me at work (804) 496-6790 or at home (804) 431-0172.

This study would not have been possible without your support and willingness to participate. Thank you again for your assistance.

Sincerely,

Carol S. Cash
Doctoral Student
Virginia Tech

APPENDIX G

December 18, 1992

2~

3~

4~

Dear 2~,

Carol Cash is an outstanding doctoral student at Virginia Tech who is currently studying the possible relationship between building condition and student achievement and behavior. She recently requested your assistance in collecting data necessary to her study.

I realize a number of important factors may have contributed to your decision to decline participation; however, I hope you will reconsider her proposal. The time requirement is minimal, though certainly a factor. In an effort to encourage your participation, I have asked Carol to include her packet of materials with this letter. Please review the materials, and if you find you can, please complete and return them in the enclosed self-addressed envelopes for each designated school.

If Carol can be of any assistance to you in this process, please contact her at Lynnhaven Middle School (804-496-6790).

Thank you for your time and assistance in supporting a fellow educator in her pursuit of knowledge and professional development.

Glen I. Earthman, Professor
Virginia Tech

APPENDIX H

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
- b. 50 - 59 YEARS OLD
- c. 40 - 49 YEARS OLD
- d. 30 - 39 YEARS OLD
- e. 20 - 29 YEARS OLD
- f. 10 - 19 YEARS OLD
- g. UNDER 10 YEARS OLD

comments: _____

2. ARE WINDOWS IN EACH INSTRUCTIONAL SPACE (CLASSROOM)?
- a. WINDOWS ARE IN FEWER THAN 1/4TH OF THE INSTRUCTIONAL SPACES
 - b. WINDOWS ARE IN AT LEAST 1/4TH, BUT FEWER THAN 3/4THS OF THE INSTRUCTIONAL SPACES
 - c. WINDOWS ARE IN AT LEAST 3/4THS OF THE INSTRUCTIONAL SPACES

comments: _____

3. WHAT KIND OF FLOORING IS FOUND IN THE MAJORITY OF THE INSTRUCTIONAL SPACES?
- a. WOOD FLOOR
 - b. TILE OR TERRAZZO
 - c. CARPET

comments: _____

4. WHAT QUALITY OF HEAT IS FOUND IN THE MAJORITY OF THE INSTRUCTIONAL SPACES?
- a. UNEVEN HEAT/ UNABLE TO CONTROL IN EACH ROOM
 - b. EVEN HEAT/ UNABLE TO CONTROL IN EACH ROOM
 - c. EVEN HEAT/ ABLE TO CONTROL IN EACH ROOM

comments: _____

5. WHAT QUALITY OF AIR CONDITIONING IS FOUND IN THE MAJORITY OF THE INSTRUCTIONAL SPACES?
- a. NO AIR CONDITIONING IN THE FACILITY
 - b. AIR CONDITIONING IN SOME INSTRUCTIONAL SPACES, OR AIR CONDITIONING IN ALL INSTRUCTIONAL SPACES, BUT NOT WELL REGULATED
 - c. AIR CONDITIONING IN ALL INSTRUCTIONAL SPACES WHICH CAN BE WELL REGULATED

comments: _____

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. IS THERE A REGULARLY SCHEDULED PAINTING CYCLE FOR INTERIOR WALLS? IF SO, WHAT IS IT?
- a. NO
 - b. YES; OVER 8 YEAR CYCLE
 - c. YES; 8 YEAR OR FEWER YEAR CYCLE

comments: _____

8. WHEN WAS THE LAST TIME THE EXTERIOR WALLS, OR WINDOWS & 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: _____

9. IS THERE A REGULARLY SCHEDULED PAINTING CYCLE FOR EXTERIOR WALLS, OR WINDOWS & TRIM? IF SO, WHAT IS IT?
- a. NO
 - b. YES; OVER 7 YEAR CYCLE
 - c. YES; 7 YEAR OR FEWER YEAR CYCLE or NOT NEEDED BECAUSE NO EXTERIOR SURFACE REQUIRES PERIODIC PAINTING

comments: _____

10. 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: _____

11. WHICH OF THE FOLLOWING FACILITIES ARE ADJACENT TO, OR PART OF, THE SCHOOL COMPLEX? Please circle all that apply.

a. FOOTBALL STADIUM

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: _____

12. HOW OFTEN ARE THE INSTRUCTIONAL AREA FLOORS SWEEPED (if wood, tile, or terrazzo) OR VACUUMED (if carpeted)?

a. MONTHLY

b. WEEKLY

c. DAILY OR MORE FREQUENTLY

comments: _____

13. 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: _____

14. 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: _____

15. 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 #14

comments: _____

16. WHAT IS THE CONDITION OF THE LOCKERS?

- a. MOST ARE NOT FUNCTIONAL OR NOT IN GOOD REPAIR
- b. AT LEAST THREE-FOURTHS OF THE LOCKERS ARE FUNCTIONAL AND IN GOOD REPAIR
- c. OVER THREE-FOURTHS OF THE LOCKERS ARE FUNCTIONAL AND IN GOOD REPAIR

comments: _____

17. WHAT TYPE OF MATERIAL IS USED FOR INTERIOR CEILINGS?

- a. WOOD OR OPEN BEAMS
- b. PLASTER OR ACOUSTICAL TILES IN AT LEAST THREE/FOURTHS OF THE INSTRUCTIONAL SPACES
- c. ACOUSTICAL TILES THROUGHOUT THE INSTRUCTIONAL SPACES

comments: _____

18. PLEASE INDICATE WHICH UTILITIES OR EQUIPMENT ARE AVAILABLE AND IN USEABLE CONDITION IN THE SCIENCE LABS.

(Please circle all that apply)

- a. GAS
- b. WATER
- c. SINKS
- d. ELECTRICITY

comments: _____

19. 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: _____

20. WHAT TYPE OF LIGHTING IS AVAILABLE IN THE INSTRUCTIONAL AREAS?

- a. INCANDESCENT LIGHTING
- b. FLUORESCENT LIGHTING - HOT
- c. FLUORESCENT LIGHTING - COLD

comments: _____

21. 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 THE ROOMS MAY HAVE SOME MINOR
FACIAL SCARS ON THE STUDENT DESKS, ALL THE
FURNITURE IS FUNCTIONALLY SOUND AND LOOKS
SATISFACTORY
- c. ALL THE CLASSROOMS HAVE FURNITURE WHICH IS
FUNCTIONALLY SOUND AND FACIALLY ATTRACTIVE

comments: _____

22. 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: _____

23. WHAT COLOR ARE THE WALLS IN THE INSTRUCTIONAL AREAS?

- a. DARK COLORS
- b. WHITE
- c. PASTEL COLORS

comments: _____

24. 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: _____

25. 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 THE FOLLOWING INFORMATION IF YOU CAN****

26. WHAT IS THE APPROXIMATE GROSS SQUARE FOOTAGE OF THE FACILITY? (Use buildings' rough dimensions)

_____ X _____ = _____
LENGTH (TIMES) WIDTH GROSS SQ FT

27. WHAT IS THE APPROXIMATE ACREAGE OF THE 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:

If you would like to have a summary of the results of this study, please include your name and address in the space provided.

Yes, I would like a copy of the results of this survey_____

Name_____

Address_____

City_____ Zip_____

If you have any questions please call:

Work (804) 496-6790

Home (804) 431-0172

Please return to:

Carol S. Cash

3245 Clubhouse Road

Virginia Beach, VA 23452

RETURN BY JANUARY 15, 1993

APPENDIX I

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 1991-92 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.]

reading comprehension _____ SS	basic total _____ SS
mathematics _____ SS	social studies _____ SS
written expression _____ SS	science _____ SS
information _____ 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 in-school suspensions _____

number of out-of-school suspensions _____

4. 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
<u>physical assault:</u> staff by students				
students by students				
students by non- students				
<u>sexual assault:</u> staff by students				
students by students				
students by non- students				
<u>homicides on:</u> staff by students				
students by students				
students by non- students				
<u>possession of weapons</u>				
<u>possession of drugs</u>				
<u>possession of alcohol</u>				
<u>possession of tobacco</u>				

APPENDIX J

Form used to Consolidate School Information

QUESTION #	CONDITION 1	CONDITION 2	CONDITION 3
#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			
#26			
#27			
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
<u>physical assault:</u>				
staff by students				
students by students				
students by non- students				

	grade 9	grade 10	grade 11	grade 12
<u>sexual assault:</u> staff by students				
students by students				
students by non- students				
<u>homicides on:</u> staff by students				
students by students				
students by non- students				
<u>possession of weapons</u>				
<u>possession of drugs</u>				
<u>possession of alcohol</u>				
<u>possession of tobacco</u>				

APPENDIX K

Free Responses from School Division Personnel

1. Based on my opinion, the poor condition of facilities has contributed to low student self-esteem and a lack of respect for the care of the facilities. Low self-esteem has affected student achievement.
2. In one elementary school which had just been remodeled the teacher commented that a 3rd grade student got off the bus and said, "Now my school looks like everyone elses." When behavior is better academic performance improved.
3. Student vandalism is absent among this student body. Cleanliness of the building and frequent repairs (fast response) contribute greatly.
4. I believe there is a positive correlation between pleasant surroundings and generally positive student deportment and achievement.
5. I have always felt that facility condition has an impact on both behavior and achievement. Students walking in halls that are already littered are more likely to litter. Desks that are already written on are more likely to be written on than clean ones. Clean, well-lighted environments are more pleasant

areas in which to work and contribute to more work being accomplished.

6. A building condition puts a cap on what we can do.
7. Nice buildings improve the behavior of students.
8. Students behave much better if the facility is well maintained and clean. They also tend to keep the building, and the outside, clean themselves if the building and grounds are well-maintained.
9. There is a direct relationship! I came to this school three years ago and began an "all out" program of upgrading the building. School pride, achievement, and behavior have improved drastically.
10. In most instances, I believe there is a strong and positive correlation between condition of the buildings, restrooms, etc., and student behavior and achievement.
11. We have done a great deal in the last 5 years to upgrade our facility! I believe there is a definite correlation between conditions of buildings and student achievement, as well as, student and community self-esteem, value, and self worth.
12. The better the building is maintained, the better student behavior and achievement. Students who feel good about their environment, and who do not feel violated or victimized by dirty, out-of-order or

makeshift facilities will extend their pride in surroundings in at least some measure, to their school work. When students see dirty floors, they perpetuate that image by throwing down trash; when they see vandalism or graffiti, then they contribute their part to it in like manner.

13. Direct correlation between cleanliness and pride.
Attractiveness and student expectations.

VITA

CAROL SCOTT CASH

ADDRESS: 3245 Clubhouse Road
Virginia Beach, Virginia 23452
Telephone Home: (804) 431-0172
Office: (804) 496-6790

EDUCATIONAL

BACKGROUND:

Doctor of Education

Educational Administration, Virginia
Polytechnic Institute and State University,
April 1993. The dissertation addressed the
relationship between building condition and
student achievement and behavior. (4.0
G.P.A.)

Certificate of Advanced Graduate Study

Educational Administration, Virginia
Polytechnic Institute and State University,
August 1992. (4.0 G.P.A.)

Education Specialist

Educational Administration and Supervision,
George Washington University, May 1991. (4.0
G.P.A.)

Master's Degree

Guidance and Counseling, University of South Alabama, June 1972.

Bachelor's Degree

Mathematics, College of Education, University of South Alabama, June 1970. (Magna Cum Laude)

EMPLOYMENT: The listed employment ranges from Kindergarten through grade twelve and includes classroom, guidance, and administrative experience in several states and in the Department of Defense Dependent Schools overseas.

1992-93 Assistant Principal, Lynnhaven Middle School, Virginia Beach, Virginia. Duties include preparation and execution of master schedule, supervision and leadership position in special education child study team, discipline of all special education and ninth grade students, orientation of elementary students to the middle school, and supervision of social studies, guidance and

special education faculty and clerical staff members.

- 1990-92 **Director of Guidance, Independence Junior High School, Virginia Beach, Virginia.** Duties include individual counseling, group guidance and counseling activities, orientation, registration, educational planning, standardized testing, development of extensive program in career awareness, including activities targeting minorities in professional positions, and representation of school at various division-wide committee.
- 1989-90 **Guidance Counselor, Kempsville Junior High School, Virginia Beach, Virginia.** Duties included individual and group counseling and guidance, record maintenance, facilitating parent - teacher conferences, teacher assistance teams, standardized test administration, and educational planning.
- 1988-89 **Long-term substitute counselor, Portsmouth Middle School, Portsmouth, Rhode Island.** Duties included individual and group work with students and teachers.
- 1985-88 **Mathematics and English teacher, Zama American High School, Zama, Japan.** Duties

included English Department Chairperson, Installation and School Advisory Committee Chairperson, Steering Committee Chairperson for NCA Accreditation and Self-Study, and member of NCA Accreditation Visiting Team for Clark Air Base in the Phillipines. Selected as Honored Teacher of the Year.

- 1982-85 **Mathematics teacher at Osbourn Park High School, Manassas, Virginia.** Duties included junior class sponsor, debate judge, development and implementation of after-school SAT preparatory program, and instructor for the Advanced Placement Calculus course.
- 1977-82 **Guidance Counselor, Princess Anne Junior High School, Virginia Beach, Virginia.** Duties included individual and group guidance and counseling activities and development of model career awareness program for students.
- 1974-77 **Mathematics teacher, Princess Anne Junior High School, Virginia Beach, Virginia.** Duties included student activities coordinator, debate and forensics coach, and PTA representative.
- 1972-74 **Guidance counselor, Oakhurst Elementary**

School, Milton, Florida. Duties included individual student psychological testing under the supervision of the school psychologist, individual and group counseling and guidance activities, and PTA board member.

OTHER PROFESSIONAL

EXPERIENCES:

Career Inclusion Committee, system-wide, Virginia Beach City Public Schools. (1990-92)

Governor's Magnet School Selection Committee, Virginia Beach City Public Schools. (1991-92)

Project for selection and curriculum for gifted At-Risk students, Virginia Beach City Public Schools. (1991-93)

Chairperson for Steering Committee for NCA (North Central Association) Self-Study, Zama American High School, Zama, Japan. (1986-87)

Member of Visiting Team for NCA at Clark Air Base, Philippines. (1987-88)

Selected as Honored Teacher of the Year, Zama
American High School, Zama, Japan. (1986-87)

SCHOLASTIC

HONORS AND

AWARDS:

Undergraduate academic scholarship (1967-68)

Undergraduate debate scholarship (1968-70)

Who's Who in American Colleges and

Universities (1970)

Top Five Leaders (1970)

Freshman Women's Honorary Sorority (1966)

Senior Women's Honorary Sorority (1970)

Debate and Forensics university awards (1969-
70)

Graduate Assistantship for Master's degree
(1970-72)

Scholarship assistance for Doctoral work
(1992)

PROFESSIONAL

ASSOCIATIONS:

Phi Delta Kappa

National Association of Secondary School
Principals

Virginia Association of Secondary School
Principals

Virginia Beach Association of Secondary
School

Principals
Association for Supervision and Curriculum
Development

Carol Scott Cook