PHYSICAL DESIGNS FOR SAFE SCHOOLS

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ABSTRACT

The purpose of this study was to investigate and report the perceptions of principals of high schools built prior to 1999 and high school principals of high schools built in the past five years as well as the perceptions of architects who build and design schools on the physical design elements that support a safe school environment. Qualitative methods of survey research were utilized to collect, analyze and interpret the data regarding the perceptions of principals and architects on the design elements that influence safety in select old and new high schools in the Commonwealth of Virginia. Data collection consisted of recorded and transcribed interviews from a select group of questions tailored for each group of participants. The data were analyzed and emergent themes were generated from the results of the transcribed interviews.

The analyzed data found consistency in all three groups in their response to the interview questions. Common themes from all three groups focused on wide open spaces that increase visibility and hallways wide enough to support the smooth flow of students. All three groups mentioned controlling access to the building by the use of security vestibules and the use of cameras to record and provide surveillance as design elements that support a safe school environment. The location of the school office was cited by all three groups as paramount to school safety. The ability of staff to see who enters the school building and the ability to funnel visitors to the main office and not allow access to other parts of the school building was cited as

crucial to a safe environment. All three groups spoke of doors and windows and the ability to secure the large number of doors as problematic.

This study also determined the need for doctoral and principal preparation programs to include specific coursework or training that involves principals in the design phase of constructing schools. Principals need to be involved in the planning and design process to insure new and renovated school buildings have the needed safety features they believe will help them in their work of educating students and providing for the safety of faculty and students. The principal should know and understand the workings of a school building and how a school organization operates. The result of such training would allow the principal to anticipate the effectiveness and consequences of certain designs in regards to the movement of students, program demands and requirements.

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CHAPTER 1

INTRODUCTION OVERVIEW

A great deal of attention has been directed towards safety in school, especially following the tragic events of school shootings such as The Jonesboro School Shooting on March 24, 1998 in Jonesboro, Arkansas in which four students and one teacher were killed and ten others wounded outside as Westside Middle School emptied during a false fire alarm. Mitchell Johnson, 13 and Andrew Golden, 11, shot at their classmates and teachers from the woods. (infoplease.com).

The worst school shooting in the United States occurred in 1999 at Columbine High School in Colorado. "Two cloaked in black trench coats and armed with guns and bombs, open fire April 20, 1999 at Columbine High School, killing 15 people and wounding 28 others in the worst school shooting in U.S. history." Those incidents became the stark reminder that the school building itself should promote a safe environment. Following those incidents, educators and architects became accurately aware that the building itself should be a safe place, and attention was given to design elements that promote safety. The Columbine High school event serves as a watershed for paying attention to the physical structure itself in making school buildings safer for the users. School shootings and other acts of violence have forced educational administrators to look differently at schools and how they are designed. Previous school designs made public access to schools inviting and easy. Modern day concerns resulting from armed intruders and other violent acts committed at schools now make it desirable to restrict access of the public.

In investigating physical designs for safe schools, the researcher's perspective was that limited research had been conducted or published on physical designs for safe schools. In contrast, research was available regarding the substandard physical environments of schools and its effect

on student achievement. Research done by Cash (1993), looking at small rural high schools in Virginia, determined there were significant differences in achievement test scores of students who attended school in above- standard buildings compared to those students who attended school in sub-standard school buildings.

According to the United States Department of Education's National Center for Educational Statistics, in 1998, the average age of schools in the United States was 42 years old. The mean average ranged from 46 years in the Northeast and Central States to 37 years in the Southeast. (1999). The aging of America's schools increases the need to address the issues of design safety in order to make the designs of school buildings compatible with current safety concerns. These design issues alone affects 28% of American schools that were constructed between 1950 and 1969 as well as the 17% of schools that were built from 1970 to 1984 (Lewis, Snow, & Farris, 1999).

According to *the Report from the National Summit on School Design* (NSSD) (2005), poorly designed school buildings or buildings that are poorly maintained provide an undesirable environment for student learning and achievement. In addition poorly maintained buildings provide for an unsafe environment as well.

Based on information from the National Center for Educational Statistics about one –fourth of all schools that were in existence in the United States at the end of the twentieth century were constructed prior to 1950, and 45% of all schools were built between 1950 and 1969 (1999). In examining these facts, it is not difficult to determine that most of the school buildings in the United States are aging facilities with design features that do not support modern day issues of school safety that impact today's schools.

A building design will not solve all the problems associated with safety, but by addressing safety and security in the design process, a design team can assist in resolving some of the

concerns expressed by the users of the building. Issues that can impact safety and security should be an important component of the design process.

Some administrative measures can assist with helping to keep schools safe. Measures such as zero-tolerance policies, dress codes, and school resource officers are examples of what is known as passive security systems. While these are important components to a safe school, they typically do not have an influence on design issues.

Active security systems such as closed circuit television, alarm systems, motion detectors, and access control systems increase security even more but can be cost prohibitive. "Due to the fact that most school districts can't afford expensive security systems, school designs must allow complete surveillance by staff with as little effort as possible."The ability to control access doors, especially the main entrance is vital in maintaining a safe learning environment" says police officer Charles Virgil, formerly of the Denver County Sheriff's Department. (Prager, 2003, p. 40-43).

The use of technology to support safe schools is an important part of the research on designing safe schools. Schools that have architectural barriers because of age and design can utilize modern technology to assist in creating a safer environment for all stakeholders. Cameras, communication systems, lighting, sensors, and weapon screening devices can contribute to the overall safety and security of a school but not in all instances.

School staff members are able to address security with equipment such as video cameras or metal detectors, but for an architect, the best way to ensure that a school building is a secure environment is to design it that way. Some of the designs could include wider hallways, curves instead of corners and designs for smaller school environments.

The authors of *Planning Safer Schools* (Carter & Carter, 2001) contend that the threat of crime in schools can be reduced through wise environmental design. Crime Prevention Through

Environmental Design (CPTED) is an organization that provides for an evolving body of knowledge and public safety initiatives. CPTED promotes principles and strategies that can result in safe, orderly and comfortable schools. CPTED makes the assertion that the physical environment can affect feelings, behaviors, and the way we view others. It also can affect the safety or perceived safety of those who use the environment. Meticulous design, appropriate use of the environment and good maintenance of the environment can promote positive interactions, orderly behavior and increased perceptions of safety among the occupants.

Research Questions

The main research question for this study is:

What are the design elements that principals and architects believe promote a safe high school?

The following sub-questions guided the development of this study:

1. What design elements would an architect think influence school safety?
2. What design elements would a high school principal think influence school safety?

Significance of the Study

Physical designs for safe schools are important and significant to the users of schools, those persons who manage schools, and to those persons who design schools. The potential benefit of this research is that the results may provide information that educators and architects think are important design features that promote school safety. The research also has the potential to assist in the modification of older school buildings that can be renovated to address modern day issues of school safety.

Educational and architectural researchers will benefit from this study. Its methods and findings should be used to further investigate physical designs that support safer schools.

The final impact of the study will be for students who will benefit from facilities that have been designed with safety in mind.

Definitions

For the purpose of this study, the following definitions were used:

School Safety – An environment in which all users of a building feel safe and comfortable.

School Facilities – Buildings and grounds, parking lots, playing fields and fixed equipment that are used for educational purposes.

Safety Feature – Feature of a building that is added to ensure a user's safety (www.the freedictionary.com).

New School Building – School facility constructed within the past 5 years.

Old School Building – School facility constructed 20 or more years ago.

Renovated School Facility – School building that has been renovated within the past five years.

School Design Elements – Individual structural elements that can be separately added to or deleted from the design of a school building.

School Violence – Any behavior that violates a school's educational mission or climate of respect or jeopardizes the intent of the school to be free of aggression against persons or property, drugs, weapons, disruptions, and disorder (Center for the Prevention of School Violence, 2002).

Safe School – The total climate that allows for staff, students, administrators and visitors to interact in a way that is positive and nonthreatening, reflects the mission of the school and fosters positive relationships and personal growth. Expectations for student behavior are clearly articulated, consistently enforced, and applied fairly.

Limitations

The limitations of this particular study include the research data that was collected representing the opinions, ideology and beliefs of the principals and architects of newly built

high schools or high schools that were built more than twenty years ago. The research was limited geographically to ten high schools in the Commonwealth of Virginia. In addition, data were collected only from five high school principals in buildings constructed prior to 1999 and five principals in buildings constructed within the past five years, which limits the applicability of the findings to those individuals. In addition, five architects provided their opinions and those opinions may be limited by their design experience and beliefs about school buildings. Limited exposure of architects to experience in designing schools would definitely have an impact on the study. Therefore, it was important to select those architects who have experience in the planning and design of high schools.

Organization of Chapters

Chapter one provided an overview or introduction to the research study. Chapter Two provides a review of the literature that was used to inform, frame, and show a need for the study. Chapter three provides information on the Methodology utilized in the research study. It includes a review of the research questions and the research design, data needs, research protocol, population, sample, data collection, and data analysis. Chapter Four contains the data from the three sets of interviews done with principals and architects. It also contains the common emergent themes developed out of the three sets of interviews. Chapter Five contains the interpretations, conclusions, and recommendations developed as a result of the qualitative study done to examine the perspectives of high school principals of high schools built prior to 1999 and high school principals of high schools built in the past five years as well as the perspectives from architects that design high schools.

CHAPTER 2

LITERATURE REVIEW

Chapter 2 provided a review of the literature that was used to inform, frame, and show a need for the study. The introduction included the organization and content of the review. In reviewing the available literature on physical designs for safe schools, the researcher found that very limited research was available on the topic. Not much research had been done on this subject. Because of the limited amount of research on this subject, literature was reviewed on studies involving student achievement and physical conditions of school facilities. The literature review also contained an examination of safe schools and what made them safe.

The primary purpose of the study was to collect and examine perspectives of high school principals and architects who design and build schools about the physical designs that influence safety. Specifically, two groups, principals from high schools built before 1999 and principals from high schools built in the past five years, were included in the data gathering. Architects who have specialized in designing school buildings were the third group to be interviewed.

The desired design characteristics for safe schools were researched as a part of the review of literature. Principals and architects were interviewed about physical designs that promote making a school safe. The literature review included research studies on safe school design guidelines, educational facilities, planning, theoretical literature, commentary literature, conceptual literature, and web-based documents outlining best practices.

The search terms that were useful in locating the studies reviewed included the following terms: *safe schools, school safety, safety designs for schools,* and *safe high schools.* Search engines utilized included reference databases, The Educational Resource Information Center (ERIC), Addison, and library catalog. Materials were also accessed from the Inter Library Loan

Internet accessible database (ILLiad) at Virginia Polytechnic and State University. The researcher also reviewed online materials on safe schools and selected sources.

Because few studies have been developed on physical designs for safe schools, a lot of the data collected and reviewed centered around design issues related to student achievement and safe schools. While studies are available on school design, they tended to focus on design issues that impact student achievement.

Two studies (Cash, 1993 and Earthman, 1998a) determined a link between student performance and behavior relating to the physical building in which the students are educated. Building condition factors were examined and all of them were found to have an impact on student learning based on standardized test scores. A replication of Cash's study was done by Earthman, et al, (1996). The results of this study confirmed the findings by Cash. Hines (1996) conducted a similar study by using basically the same instrument and methodology as Cash but instead used a population that consisted of large urban high schools in Virginia. All researchers found the same range of differences in the achievement scores of students in substandard buildings versus student scores in above standard buildings when a control for socioeconomic differences among the different school divisions was used. The replicated study generated a difference of five percentile rank points on the composite achievement scores for students in buildings that were deemed substandard versus students in above standard buildings and differences of seven and nine percentile rank points on reading vocabulary and spelling sub-tests. In the Hines study, he found higher differences in his study of large urban high schools. The differences between students in substandard buildings and students in above- standard buildings were 14 percentile rank points on composite achievement scores and as high as 15 and 17 percentile rank points on reading and mathematics sub-tests respectively.

Earthman and Lemasters (1996) reviewed several studies of the influence of school conditions on academic achievement. All of the studies basically found the same relationship, within varying degrees, between school achievement and school facilities. The relationship was that the higher rankings of structural and mechanical or cosmetic conditions correlated with higher achievement scores. The relationship was found to be stronger for cosmetic than structural school conditions.

Moore and Lackney (1993) discovered a primary relationship between the architectural design of a school and educational reform that would, in addition, affect the learning environment of students and teachers. Moore and Lackney concluded that the design patterns of a building have an influence on how well schools are capable of performing. This knowledge established an importance on the building floor plan itself as a mechanism for improving student performance. The analysis they performed involved 100 buildings from the United States, Canada, England and other European countries that were considered to be the best designs in the 1980s and 1990s. The analysis used was not scientific in the collection of data but centered on commonalities of the buildings.

A study by Andersen (1999) analyzed the relationship between school design variables and scores on the Iowa Test of Basic Skills (ITBS). The research question or problem simply put was: Do school design features relate to student achievement? The purpose of the study was to determine if student outcomes are influenced by facility design elements in middle schools. The study is relevant to architects who design schools as well as school administrators who manage facilities. Outcomes for administrators include a better understanding of relationships between certain facility design elements and student achievement. Outcomes for students involve them benefitting from facilities that have been designed for them based on the size of the facility, interests of students, social structure, academic focus, and current and future technology needs.

The study was limited by a couple of factors, including local geography. All the schools in the study were located in the central Georgia area. The next limitation was the subjectivity of the Design Appraisal Scale for the Middle (DASM). This is an evaluation instrument that was used to measure the school design elements identified in the study. The instrument was based upon a modification of an instrument originally designed by Tanner (1999). The population of the study consisted of 50 middle schools located in 14 contiguous counties in the central Georgia area. Twenty-two schools were randomly selected from the population. The total number of students in the population of schools was 46,201. Based on the findings of the research, application of the DASM and the analysis, the following conclusions were reached: Schools that typically look good on the outside also served the needs of the students on the inside; schools that fully used their learning spaces or environments, both inside and outside, performed better on the ITBS. The findings of the study led to the conclusion of the researcher that the more different learning environments provided to students, the higher the scores that students achieved on the ITBS. This study continued the theme that seemed to support the positive influence of design elements on student achievement. Andersen (1997) called for future research to explore the relationship of facility design to high school student achievement as well as in colleges, universities and technical schools.

Shapiro (1998), in a study entitled Perceptions of Educators about School Design Issues included educators in eleven public schools in Cobb and Fulton Counties. One group consisted of four elementary school teachers, two middle school teachers, three high school teachers, one elementary school principal, and one middle school assistant principal in one focus group. The second group was composed of nine public school educators from DeKalb County and the city of Atlanta. This group consisted of two elementary school teachers, two middle school teachers, two high school teachers, one elementary school principal, one middle school principal, and one

high school principal. Participants were recruited randomly by phone. This was done by initially utilizing focus groups to identify specific topics for a nationwide telephone survey. The study was divided into two empirical sections plus a conclusion section. The first section of the study involved the educators from the Georgia area. The second section contained an analysis of the results from a telephone survey that included 120 teachers and 30 principals and assistant principals from each of seven different metropolitan areas that included Atlanta, Cleveland, Dallas, Los Angeles, New York, San Francisco, and Seattle. Professional interviewers contacted the respondents and interviewed them by phone. Total sample size of the telephone survey was 1,050.

Elementary teachers made up just over half of the sample and middle and high school educators made up one quarter each. The unanimous belief is that school design is an important component of education. Teachers and administrators recognized that design issues can strongly impact, either positively or negatively, the learning process. The study did address safety issues, determining that school design should address security challenges that include access to the school grounds and buildings. The highest ratings of school design elements were safety and security elements. Out of the seven metropolitan areas, the ratings ranged from 93% to 99% on safety and security elements. Educators in this study considered security to be the most fundamental aspect of school design. The results indicated that educators across the country seem to agree how important school design is for creating a good learning environment.

Bishop (2009) investigated the influence of facility designs of new Virginia high schools on student achievement and staff attitudes. This qualitative study was designed to examine the perceptions of the principals, the teachers and staff at new high schools regarding the impact of design elements.

The main goal of the study was to formulate a clear theory, based on the data collected from research participants to explain: (1) why students who attend new high schools appear to have higher rates of student achievement than students in older buildings and (2) why staff and teachers of new high schools report information that either supports of refutes the phenomenon.

The case study involved three high schools that opened in Virginia between 2006 and 2007. Three different locations were selected for the case studies. Each represented a different type of setting: urban, rural and suburban. The study attempted to determine whether or not the design of new high school facilities improve: (a) student achievement, as reported by the principals, teachers, and staff members of the new high schools; (b) the attitudes and behaviors of staff members of the new high schools; and (c) the attitudes and behaviors of students attending the new high schools, as reported by principals, teachers, and staff members of the new high school under study perceived a relationship between design elements and student achievement.

Data for the research were collected through interviews with each building principal and focus groups that consisted of teachers and staff. The interviews were based, in part, on the CAPE survey created by Cash (1993) and replicated by Hines (1996) and Ayres (1999), in addition to the research sub-questions created for this study. The conceptual framework of the study was based on the model that was created by Cash to examine the relationship between building conditions and student achievement and behavior in the rural schools of Virginia. This same model was used by Earthman et al. (1995) to study high schools in North Dakota and reached a conclusion similar to Cash that physical conditions of school buildings do impact student achievement and student behavior.

Three themes were generated from the interviews with principals: the planning and actual preparation for the opening of the school building was more difficult than the actual opening of the building. All principals shared the belief that there was no perceivable impact of the design

elements within the building on student achievement, and there was a positive impact on student behaviors in the new building in comparison to behaviors in the old building. The focus group interviews also identified three themes: improved student behaviors, improved staff behaviors, and impact on student achievement. While student scores increased on end-of-course (EOC) and SOL tests, the study results indicated that teachers did not believe that students performed differently academically.

A study conducted by McMichael, (2004) to collect and examine the perspectives of elementary school facility planners, architects, elementary school teachers, school district superintendents, and elementary school administrators regarding three progressively specific sets of school facility design characteristics and their influence on elementary education was included in the literature review because of its research on design elements. The design characteristics included six general design principles produced by the U.S. Department of Education, 33 previously published broad education principles, and 86 specific complementary design characteristics located in the Design Assessment Scale-Elementary (DASE) produced by the University of Georgia's School Design and Planning Laboratory. This study collected data via the use of an electronic questionnaire called Perspectives of School Planners and Architect and Professional Educators Regarding Elementary School Facility Design Characteristics. This questionnaire was designed and sent out to educational professionals and elementary facility planners and architects across the United States to collect data regarding their perspectives related to three designated sets of design characteristics. Interestingly, this study's results showed that respondents working directly in the school system did not view that the input from parents and community members as an important component to the design process. Also, architects and superintendents viewed the area of providing adequate health, safety, and security as significantly less important than the other groups. The fact that these two groups found this area

to be less important is alarming in the sense that the physical space is important to ensuring the continued safety and health of staff and students and should be the forefront of any school design.

A study that examined the effects of lighting on human performance by Heschong (1999) established a statistical connection between day lighting and student performance and sky lighting and retail sales. The study examined 21,000 school records from three school districts in three states as well as the day lighting conditions in over 2,000 classrooms. Data showed students with the most classroom day lighting progressed 20% faster on math tests and 26 percent on reading tests in one year than those with the least. Likewise, students with the largest windows advanced 15% faster in math and 23% faster in reading than those with the least. The study determined further that there was a 7 to 18% faster educational progress than those with fixed windows with no regard to air conditioning. These effects were observed with 99% statistical certainty. The findings were consistent regardless of teaching styles or curricula. This is interesting, given the fact that the three districts have different curricula and teaching styles, different school building designs and very different climates. Yet, the results of the studies consistently show positive and highly significant effects. The consistency of the results persuasively argues that there is a valid and predictable effect of day lighting on student performance.

Test score results for over 21,000 students were analyzed from three school districts located in Orange, California, Seattle, Washington, and Fort Collins, Colorado. Data analyzed included information about student demographic characteristics and participation in special school programs. In addition, architectural plans, maintenance records, and aerial photographs were reviewed and visits made to samples of the schools' population to classify the day lighting conditions in over 2,000 classrooms. Each classroom was assigned a series of codes on a 0-5

scale indicating the size and tint of its windows, the presence and type of skylighting, and the overall amount of daylight expected.

The study utilized multivariate linear regression analysis to control for other influences on student performances. The regressions were compared utilizing data from two separate tests, math and reading, for each district. The math and reading models were also run separately using the window and skylight codes, and then the overall daylight code. The result is the creation of twelve models for comparison, consisting of four models for each of the three school districts.

The day lighting conditions at the Capistrano School District were the most diverse and the most detailed. Scores were studied for changes in student test scores over the school year. In addition, the Seattle and Fort Collins studies utilized final math and reading test scores at the end of the school year. Both school districts were found to have positive and highly convincing effects for day lighting. Students in classrooms with the most day lighting were discovered to have 7% to 18% scores higher than those with the least light.

Although the three school districts have different curricula and teaching styles, different building designs and considerably different climates, the results of the study showed perpetually positive and highly significant effects. The consistent findings support persuasively the argument that there is a conclusive and predictable effect of day lighting on student performance.

Tanner and Langford (2002) in a study of the importance of interior design elements as they relate to student outcomes investigated the perceptions of elementary school principals of the influence of interior designs elements such as floor and wall coverings, lighting, flexibility acoustics, color, texture, patterns, cleanliness and maintenance on student achievement , teacher retention, and student attendance. Further issues addressed in the study were: Does the acoustics of the environment relate significantly to student achievement? What floor coverings in the

classroom relate significantly to the acoustics of classrooms? Are there any possible links between floor coverings in the classroom and student achievement?

The population of the study consisted of public elementary schools in the state of Georgia in 2002. A random sample of 100 elementary school principals in Georgia was given surveys to complete. A sample of schools having carpeted and hard surface flooring were selected for site visits to gauge reverberation time and background noise. Both a sound level meter and reverberation meter were used to measure acoustics.

While some documentation does exist regarding the perceptions of teachers concerning physical environments and its influence on student learning, behavior, and achievement (Schapiro, 2000), the literature is incomplete regarding perceptions of elementary principals on the importance of interior design elements, including floor coverings, in schools. Outside the perceptions of teachers and principals, there exist only a few scientific studies on the impact of physical environment on student achievement (Heschong Mahone Group, 1999; Tanner, 2000b; Weinstein, 1979; Yarborough, 2001). Even though the National Center for Educational Statistics (2000) has provided some research in the area of school facilities regarding age and maintenance of school buildings, it has failed to incorporate data relating the physical environment to student achievement.

Utilizing the results of the principals' perceptions, a sample of schools with both perceived good and bad acoustical environments was selected to be studied further. The last mentioned component involved acoustical measures in the perceived good and bad acoustical environments and compared the measures of sound levels in the two environments to student achievement. The concerns about the floor coverings' role in noise absorption and how it contributes to classroom flexibility, safety, and security were investigated with respect to student achievement.

This study extended the findings of Schapiro's 2000 study to include the perceptions of elementary principals regarding the interior design of schools. Schapiro (2000) revealed that 73% of a national sample of teachers perceived the interior design of schools to be very important for creating a good learning environment; 55% believed that classroom design impacts student achievement and 69% had a preference for carpeting or a combination of carpet or linoleum, tile or hardwood. Another reason for the study was to provide an objective measurement of student achievement and to determine if it is possibly a function of acoustical environment.

The study concluded that over 95% of elementary principals felt that school interior design is important for creating a good learning environment. In addition, over 90% suggested the school's interior design impacts teacher retention. Approximately 85 % were in agreement that interior design is "somewhat" to "very important " in impacting student attendance. However in comparison, Schapiro determined that almost 99% of the national teachers that were surveyed found interior design "important" to "somewhat important " for creating a good learning environment.

Better school design can greatly increase the safety of children by creating environments that facilitate proper supervision and minimize "uncontested harassment" of individual students. (Scanlon and Pillar, 2000). In addition, the literature review entailed data that seems to relate to the influence that building designs have on student performance as well as information that supports the idea that if building design features influence student behavior and performance it can be concluded that safety features of a school can influence student behavior as well.

Chapter 3

Methodology

This chapter includes a review of the research questions and the research design. Qualitative methods of survey research were utilized to collect, analyze and interpret data about the perceptions of principals and architects on the design elements that influence safety in old or new high schools in Virginia. The research study was about physical designs that promote safety in selected high schools. The focus was on both high schools built prior to 1999 and those that have been recently constructed.

Research Questions

The main research question for this study is:

What are the design elements that principals and architects believe promote safety in a high school?

Sub questions include:

1. What design elements would a high school principal think influence school safety?
2. What design elements would an architect think influence school safety?

Data Needs

The data needed to answer the research questions dealt with the perceptions of individuals who are either users of a school building or design professionals who actually design school buildings. These three groups of individuals will be able to provide first-hand information about the safety features of a school building that help school safety. Principals from high schools constructed pre-Columbine High School and principals of high schools constructed in the past five years were interviewed. Architects who routinely design school buildings formed the third group of individuals who were interviewed.

Qualitative research begins with assumptions, a worldwide view, the possible use of a theoretical lens, and the study of research problems inquiring into the meaning individuals or groups ascribe to a social or human problem (Creswell, 2007). The ultimate purpose of qualitative research is learning. To study the questions, the researcher collects data-- the basic units or building blocks of information. Data are images, sounds, words or numbers. When data are grouped into patterns, they become information. When information is put to use or applied, it becomes knowledge (Rossman, Rallis, 2003). In that light, data collection procedures will include interviews developed and piloted prior to presenting them to the groups of individuals to be interviewed.

Population

The intent of this study was to identify design elements or features in high schools that were perceived to help or hinder the safety of the users of the building. As such, it was necessary to ascertain the perceptions of the users of the building and the design professionals regarding the design elements or components that are involved in the safety of the building. School principals, and architects all have a vested interest in promoting safe school buildings and it is these groups that were able to provide data regarding important design elements or features to consider in promoting a safe school environment.

Two groups of principals, one group in high schools that were constructed prior to the Columbine High School incident and the other group of principals of schools built in the past five years were included in the population. In addition, architects who had a history of designing educational facilities were included in the data collection. This made three groups of individuals to provide data for the study. From these three groups, a random sample was drawn. The random sample of high school principals came from data from the Virginia Department of Education on high schools built pre-Columbine and high schools that were built and designed in the past five

years. Principals were selected from this data set. Architects were selected from members of the Virginia Educational Facility Planners (VEFP) .

Sample

Three groups of individuals were included in the study to provide data to answer the research questions. The first group of individuals was the principals of high schools built prior to 1999. Two groups of high school buildings were identified.

The second group, were those high schools constructed within the last five years. The Virginia Department of Education maintains records of school buildings constructed and the date of construction. A list of school buildings that were constructed within the past five years was obtained. Likewise, a list of school buildings constructed prior to 1999 was obtained. From these two lists a group of five buildings each were randomly selected. A total of eight school divisions were a part of the research study. The principals of these high schools were the individuals who supplied data for the study.

Upon requesting and receiving permission from the selected school divisions, the interviews took place at the school site in the office of the principal. The interview protocol was reviewed and approved by the researcher's advisor before it was used.

The Virginia Educational Facility Planners is an organization composed of practicing educators and architects who have a history of planning and designing educational facilities. A listing of the architects who are members of the VEFP was obtained from the organization. A random sample of five architects was drawn from this list. This sample included architects who had designed high schools in Virginia in the past five years. The total number of architects on the membership list was determined. Utilizing purpose selection process five architects were selected from five separate architectural firms. These firms were the ones that have designed the most high schools in Virginia.

A second group of five architects were chosen in like manner. In the event that architects from the original group choose not to participate, architects from the second group were selected to substitute. Totally, 15 interviews were conducted with five high school principals of schools built prior to 1999 and five principals from high schools most recently constructed. In addition, five architects who have designed high schools in Virginia in the past five years were interviewed. The researcher composed five to nine open-ended questions that provided for detailed responses from the two groups of principals and the randomly selected architects regarding what they think, what they know, and how they feel. It should be noted that none of the selected architects designed any of the schools in the study. Only one of the architects that were selected was unable to participate because of other demands. He made arrangements for the researcher to interview another architect in his firm with extensive background in designing high school to participate in being interviewed.

Research Protocol

Interview protocol included written and verbal explanations of the purpose of the study and instructions to the participants. Interview questions were standard language phrases and exact vocabulary. Vocabulary related to the topic were defined and given to the participants before the interview was held. The interview questions were developed based on the research questions. Creating effective research questions for the interview process is a crucial process to interview design. Wording should be open-ended and questions should be as neutral as possible. The interview questions were validated by a group of three principals and the Director of Instruction in the researcher's school division. The interview protocol was piloted with three administrators from the researcher's school division. A principal from the intermediate school, middle and elementary school were asked to pilot the questions on the clarity of the questions being asked, the vocabulary utilized in the questions, the time to complete the interview, the skill of the

interviewer, suggested changes. Information gleaned from the test interview was used to make necessary changes in the actual interview questions. These individuals were not a part of the population of the study. A digital recorder was utilized to record the pilot session. A standard recorder was used as a backup.

Recording and transcribing the pilot interviews lessened the possibility of errors and inaccurate data. A log was maintained by the researcher to document all the pertinent information to include dates and times and locations of all interviews as well as participants' names and contact information. This log also included the number of the tape and recording count information from the start and stop designations.

In the research study, permission was requested from the selected school divisions (Appendix A). The researcher completed an application to the Virginia Polytechnic Institute and State University Institutional Review Board (IRB) explaining the study and to discuss any potential harm that could come as a result of the research to the subjects. Permission allowed the researcher to conduct the study. Permission was requested from the selected school divisions. (Appendix A).

A set of questions tailored to the interviewee were designed (Appendix D).

The purpose of the research was explained to the subject. The interview questions along with a consent document were sent ahead of the interview with a cover letter asking for any documents, data resources that may be helpful to be identified where possible prior to the interview. Permission was requested to tape the interview and interviewee was advised that transcripts of the interview would be provided for clarification and amendment.

During the interview, the researcher again provided background information regarding the research study. Permission was requested again to tape the interview. The researcher did speak to the confidentiality of the research study and its subjects. A check of the tape and batteries along

with a voice check was conducted. The researcher did take notes during the interview and, prior to the ending, identify any follow up activity and request permission to follow up with any issue with a telephone, email or face- to- face contact.

Data Collection

The interview protocol for both principals and architects had five to nine semi-structured, open-ended questions. It took approximately 30 to 40 minutes to complete each interview (Appendix C, D). The development of the interview questions were based on the research, review of the literature and the research questions. The interview protocol and questions were chosen meticulously and were sensitive to the intent of the research questions, being approved by the IRB and the dissertation committee. Questions were designed to direct and guide the interviews and to evoke descriptive data on physical designs that promote school safety in selected high schools in Virginia.

The creation of two protocols--one for architects and one for principals—is necessary because there are questions that only an architect can answer and some that deal with a specific building that only the principal can answer. There also exist, common questions that both the architects and principals can answer (Appendix E). The questions that have been identified as common questions for both groups have much to do with design features, elements, and physical barriers. All interviews began with the researcher recording the time, date and location of the interview and the participant's pseudonym. This process was used to test the operation of the equipment used as well as to provide for introducing identification for the interview.

The interviewer utilized a semi-structured interview with questions designed for each group of responders. This allowed variations of responses from the groups of principals and the architects and provided the researcher with more comprehensive data.

After all interviews were completed, the recordings were transcribed. All tapes were replayed to verify accuracy. Tapes, original transcripts and interview notes were maintained in a locked file cabinet, with the researcher having sole possession of the key. After completion of the dissertation process, the data will be destroyed. The interview protocol was reviewed and approved by the researcher's advisor before it was used.

After the interview, the researcher, wrote up contextual interview notes and sent tapes to be transcribed, wrote a letter of thanks to the interviewees, checked and edit transcripts, and sent out transcripts to the interviewees to confirm or amend accordingly.

Relationship between Research Questions and Interview Questions

Principal Interview Questions:

1. Specifically what is the most important design element, component, or feature in the school building to make the school safe?
2. Have there been additional design elements added to your buildings now that were not in place prior to 1999?
3. What is the most dangerous place in the school building? Are there ways to design these places to minimize danger?
4. What is the most pressing safety need in your school?
5. What safety activities does your school do best?
6. What are the biggest physical barriers to improve school safety measures?
7. What other factors regarding school design do you believe affect school safety?
8. What role does the physical design play in school safety?
9. What design features in the school have been incorporated to accommodate technological upgrades for safety and security

Architect Interview Questions:

1. Specifically what is the most important design element, component, or feature in the school building to make the school safe?
2. Have there been additional design elements added to buildings now that were not in place prior to 1999?
3. What is the most dangerous place in the school building? Are there ways to to design these places to minimize danger?
4. What are the biggest physical barrier to improve school safety measures?
5. What design features in the school have been incorporated to accommodate technological upgrades for safety and security?
6. Has the federal government or state mandated any added or different safety designs since 1999 that must be incorporated in schools?
7. Do you think schools designed after 1999 are generally safer that those designed before that date? If so, in what ways?

Common Questions:

1. Specifically what is the most important design element, component, or feature in the school building to make the school safe?
2. Have there been additional design elements added to the building now that were not in place prior to 1999?
3. What is the most dangerous place in the school building? Are there ways to deisng these places to minimize danger?
4. What are the biggest physical barriers to improve school safety measures?
5. What design features in the school have been incorporated to accommodate technological upgrades for safety and security?

Data Analysis

"Phenomenological data analysis proceeds through the methodology of data reduction, the analysis of specific statements and themes, and a search for all possible meanings" (Creswell, 1998). Additionally, Miles and Huberman (1994) stated that data reduction occurs continually throughout the life of qualitative data. Data reduction, by way of defining the research questions, determining the conceptual framework, and determining the data collection method has already begun. Data reduction will continue with writing summaries, coding and making clusters of statements.

Patton (1990) noted that the purpose of open-ended interviewing is not to put things in someone's mind (for example, the interviewer's preconceived categories for organizing the world) but rather to access the perspective of the person being interviewed: "People are interviewed to find out from them things we cannot directly observe" (p.196).

As the interviews were completed, the data were transcribed precisely. Typed transcripts were provided to the participants through email. This allowed for the participants to check their statements for accuracy. Structured outlines from transcribed data were utilized to form main themes. The researcher developed sub-themes from the interviews and field notes and positioned them with the broader themes from the outline.

Creswell (1998) stated that phenomenological data analysis proceeds through the methodology of reduction, the analysis of certain statements and themes, and a search for all the possible meanings. The researcher needs to set aside all prejudgments, bracketing his or her experiences.

The researcher searched for and identified, "the smallest amount of information that is informative by itself" (Vaughn, Schumm, & Sinaguh, 1996, p. 106) looking for words and phrases that will comprise units that seem interesting or that are significant to the researcher. The intent of utilizing qualitative data analysis is to gain an abundant description of data that will

be collected from the participants. Merriam (1998) concurred that constant data analysis should be conducted in combination with data collection. Merriam also suggested that without continuous analysis, the data can be unfocused, repetitious, and overwhelming in sheer volume of material that will be needed to process.

The process of data display was utilized to organize, condense, and assemble information in a visual manner. These displays were conceived in forms such as: 1) structured summaries; 2) vignettes; 3) diagrams; or 4) matrices with text (Denzin & Lincoln, 1994). Data display was implemented in combination with data reduction. Codes and categories start the process of data display. Structured outlines from transcribed data were utilized to form main themes. The researcher identified sub-themes from the interviews and field notes and positioned them with the broader themes on an outline.

Conclusion Drawing and Verification

Conclusion drawing and verification involves interpretation and drawing meaning from the displayed data (Denzin & Lincoln, 1994). After organizing, presenting and analyzing the data the researcher summarized the entire study. The findings were distinguished from prior research, suggestions made for further investigation and discussions in regard to the outcomes in terms of social meanings and professional and personal values.

Methodology Summary

The data collected for this qualitative study were obtained from three groups of individuals. Five high school principals of high school built prior to 1999 and five high school principals of high schools built in the past five years. A group of five architects were also interviewed as part of the data collection. Data collection consisted of recorded and transcribed interviews from a select group of questions tailored for each group of participants. The data were then analyzed and emergent themes were generated from the results of the transcribed interviews.

CHAPTER 4

Introduction of Findings

Chapter 4 contains the data from the three sets of interviews with principals and architects. Common emergent themes that developed out of the three sets of interviews are also identified. A single set of questions were developed for principals of high school built prior to 1999, which was the year of the Columbine incident and high school principals of buildings built in the past five years. A separate set of questions for architects who build and design schools was also developed.

Each group of interviews was analyzed separately. The researcher utilized structured outlines from transcribed data to form main themes. In addition, written summaries, coding of terms and developing cluster of statements were utilized in analyzing the data. Phenomenological data analysis was conducted in combination with the collection of data. Upon completion of the analysis of each group, the responses were compared. The responses from the architects were analyzed separately with the exception of the common questions for each group.

Group One Pre-1999 High School Principals

The five high schools involved in group one of the three sets of interviews were selected because they were constructed prior to 1999. High School #1 was constructed in 1991-92 with an additional wing that houses vocational programs added in 1999. Student enrollment was 1560. High School #2 was constructed in 1998 with no additions and a student enrollment of 2,040 students. High School #3 opened in 1995 with no additions and a student enrollment of 608 students. High School #4 was built in 1959 with an additional wing housing career and technical classrooms added in 1998. It had a student enrollment of 1500. High School #5 was constructed

in 1994 with no additions since its initial construction. It had a student enrollment of 1,200 students.

Synthesis of Pre-1999 High School Principal Interview Themes

Question #1 asked, what is the most important design element, component, or feature in the school building to make the school safe.

High School Principal #1 spoke of looking at the interior and exterior of the buildings. " On the exterior side, you may consider where your doors are, how are they secured, how many doors do you have, what are the access points, how visible are those access points, and are there other obstacles in the perimeter of the building that allow for an intruder or some other type of safety hazard? " And on the internal part of the building, the way that the building flows, how traffic flows and how easy it is to get from point A to point B.

High Principal #2 stated, "I'm not sure there is one important design element other than the fact that the layout of the building itself provides sight lines in basically all directions. "There are a few areas that are of concern to us I think, but I think it's the general flow of the building." "It has three main halls, and several cross halls, and upstairs there are no cross halls. It's just a rectangular hallway around classrooms, so I'm not really sure that there's anything that would point to that was an important design element to make it safe specifically."

High School Principal #3 felt areas of the school need to be open and easily visible by staff for proper supervision.

High School Principal #4 felt the capacity to lock all doors and keep the building secure and high visibility in the lobby where the main doors that are unlocked are in main view of the office.

High School Principal #5 reported "wide open common spaces where large groups of students can congregate and designs that support high points of visibility over large groups of students."

The response to question one yielded various responses, but all seemed to focus on wide open spaces and maximum visibility. One principal's response was, "In my opinion, the areas in the school need to be open and easily visible by staff for proper supervision." Three of the five principals indicated doors as a part of their response to question one of the interviews, with High School Principal #4 saying, "I would say the capacity to lock all doors and keep it secure." The comments on doors centered, around where they are located, how they are secured, the number of doors, how visible they are, the capacity to secure all doors and the ability to monitor the doors to prevent students from placing objects in the doors to prop them open.

Question #2 asked, what additional design elements have been added to your building, that were not in place prior to 1999.

High School Principal #1 reported an addition of a vocational wing in 1999.

High School Principal #2 indicated no additions to the building since initial construction.

High School Principal #3 cited the installation of cameras in the hallways and the parking lot as well as electronic locks on the front and rear doors of the school.

High School Principal #4 had a new Career and Technical wing added in 1998 to accommodate shop and vocational classes.

High School Principal #5 stated no additional design elements have been added to the building.

Since initial construction, two out of the five High School Principals have had additions to their buildings. It is noted that both of these schools are located in the same county. One high school had cameras and electronic locks installed after initial construction. Three of the five Principals report no new design elements have been added since the school opened.

Question #3 asked, what is the most dangerous place in the school building? Are there ways to design these places to minimize danger?

High School Principal #1 spoke of dangers within the school building involving places inaccessible and low visibility like locker rooms and restrooms. High School Principal #1 also mentioned full visibility from the outside in the way of glass doors and windows in a large commons area as a safety concern since students and staff can readily be seen by people outdoors.

High School Principal #2 reported that teachers felt the most dangerous place in the building is the intersection of a couple of hallways where all students meet during each class change. The principal reported no area as being problematic.

High School Principal # 3 stated, "There are inherent places in our building that are hard to supervise. One area is a curved hallway on the back side of school which makes visibility difficult. Also, our stairwells are in the back, at the end of each hallway upstairs and downstairs that are back hallways that are difficult to supervise." Also noted were locker rooms with locker heights that restrict visibility and create problems of inadequate supervision.

High School Principal #4 reported one intersection of halls in the building as being problematic because of congestion. All students intersect at this hallway.

High School Principal #5 felt that shop class and gym class were the most dangerous places in the school simply because everything is designed to cut, and in gym class everything is designed for throwing. The principal also mentioned locker rooms areas.

Three of the five principals cited visibility as what helps with the most dangerous places in the school building. Three principals expressed locker rooms as problematic because of limited sight lines. Restrooms were noted by one principal as being problematic. All principals agreed that the lack of visibility is an issue that helps to create the most dangerous environment. One principal spoke of shop classes and physical education areas as inherently dangerous because of the activities that occur in these places. Two principals reported intersections of hallways as the most

dangerous places in their buildings. One principal cited a curved hallway and stairways that are hard to supervise because of design issues, such as the placement of stairways in the back of the building.

Question #4 asked, what is the most pressing safety need?

High School Principal #1 mentioned surveillance as the most pressing safety need, meaning better visibility is needed throughout the structure the cameras in the school are locked into fixed positions and such they don't cover the "hotspots."

High School Principal # 2 stated more security personnel are needed.

High school Principal #3 reported door locks on interior doors as the most pressing safety need identified through a safety audit. Safety audits are done on a yearly basis. The audit team is made up of faculty and staff as well as community persons. Law enforcement and the Director of Maintenance are permanent members of the audit team for each school in the division. The staff is unable to lock classroom doors from the inside of their classrooms.

High School Principal #4 reported the lack of security cameras. In reality, the school has cameras but they are not functional in that the picture is not clear.

High school Principal #5 indicated supervision as the most pressing safety need. Additional security is needed.

Surveillance and supervision were reported by three principals as pressing safety needs in their buildings. Door locks and the inability to lock classroom doors from within the classroom was expressed by one principal and issues surrounding security cameras that are in a locked fixed position were stated by another principal.

Question #5 asked what safety activities your school does best.

High School Principal #1 reported that the school does all the routine stuff very well, such as, fire drills, tornado drills and intruder drills.

High School Principal #2 cited lockdowns, evacuations, shelter in place, tornado and fire drills are things that they do well and constantly practice.

High School Principal # 3 reported that they conduct safety audits and fire drills well.

High School Principal #4 stated they do lockdowns and fire drills well.

High school Principal #5 reported they do lockdowns and tornado drill well.

All principals indicated they do practice all safety drills on a regular basis. Fire drills are required monthly in all Virginia public schools and principals must conduct a fire drill each week in the opening month of school. All principals report they do all drills effectively. With the exception of one principal, all cited fire, tornado, lock downs. One principal stated shelter in place drills as one of the things the school does well.

Question #6 asked, what are the biggest safety barriers to improve school safety measures?

High School Principal #1 indicated locker rooms and restrooms as the biggest barrier to improve school safety measures. He also spoke of new restroom designs that include two open doorways that allow for separate entry and exit as well as allow for open access and a wrap around design help to make these areas safer.

High School Principal #2 reported that lack of space in the common areas in which students gather is the biggest barrier in improving school safety measures. The school is overcrowded with an enrollment of 2,100 students. The school now has two trailers to assist in dealing with the overcrowded conditions. As a result, a barrier for the students is created by the trailers because students are not in a secure environment as they leave the building to go outside to the trailers. This issue and not being able to secure the doors to the building to the trailers presents a problem for the principal.

High School Principal #3 indicated the location of the office reduces the ability of seeing persons entering into the school building. Even though there is a camera that is used to identify

persons entering the school building the location of the main office represents a barrier to a safe environment. Also stairwells located in the rear of the school building are very difficult to supervise.

High School Principal #4 stated the layout of the building as the biggest barrier to improve school safety measures. “The school is an old style campus school that has been enclosed. Enclosing the building resulted in some areas that are a nightmare to supervise.”

High School Principal #5 spoke of the size of the land of the school campus as the biggest barrier to improve a school safety measures. The school sits on 254 acres of land that include a middle school and a water treatment plant.

There were a variety of responses to question number 6. Principal #1 spoke of locker rooms and restrooms as barriers to improve school safety measures. Principals #2 referred to a lack of space as the school is overcrowded. Principal # 3 reported the location of the office and stairwells that are difficult to monitor because of their location. Principal #4 stated the layout of the building as the school was once a campus style school that has been enclosed.

Question #7 asked what other factors regarding design do you believe affect school safety?

High School Principal #1 noted visibility. “I think it is the biggest one, and, um, sensibility.”

High School Principal #2 referenced three stairwells that have blind spots as a design issue that affects safety at the school. Corner mirrors will be installed in the future to assist with making the areas visible for faculty and staff.

High School Principal #3 reported visibility and restricted freedom of movement with hallways that are not wide enough to accommodate the traffic.

High school Principal #4 indicated that the layout of the school is a factor regarding design that affects school safety. The school was formerly a campus style school that has been enclosed.

High school Principal #5 pointed out that cutting down trees so the roadway leading to the school can be seen as a safety factor for they need to be able to see who is coming to the school.

Four of the five principals referenced visibility as a factor that affects school safety. Two principals also cited accessibility with one principal reporting that freedom of movement with wide halls as factors that affect school safety.

Question #8 asked what role does the physical design of the school plays in school safety.

High School Principal #1 expressed the opinion that the physical design is one thing that principals don't see as an area that can be influenced by principals if they were not a part of the design team. Principals tend to focus on things that they can have some sort of control of, such as how to change the culture or climate of a building.

High School Principal #2 referenced the way the building is designed with open spaces, wide hallways and fewer secluded areas as the way schools should be designed.

High School Principal #3 indicated there is no substitute for vigilant personnel. The design should enhance supervision.

High School Principal #4 noted "the design of the hallways as a physical design of the school that plays a role in school safety." Hallways need to be wider for easy student travel throughout the building.

High School Principal #5 stated that more open spaces are needed in the building to create more visibility.

Four out of the five principals referenced wide open spaces to include wide hallways and spaces that are suitable to supervise. One principal felt it was an area that principals have no control over.

Question #9 asked, what design features have been incorporated to accommodate technological upgrades for safety and security?

High School Principal #1 reported that the school system is looking to change its surveillance system as soon as the capital improvement budget has been funded.

High School Principal #2 pointed out the need to have cameras that work properly when installed.

High School Principal #3 explained that the school in its original design was not set up for cameras. Since the school's opening, cameras have been installed throughout the building as well as on the exterior. In addition, the principal spoke of the two-way phone system and teacher-use of Skype as both communication tools and technological upgrades promoting safety and security.

High School Principal #4 explained the need of additional cameras as the technological upgrade needed.

High School Principal #5 reported the following upgrades to include: cameras, handicapped button, backup generator and air filtration system as the technological upgrades incorporated to assist with safety and security. The air filtration system is in place because of the school's proximity to Lake Anna nuclear plant.

All five principals specified cameras as the technological upgrade for safety and security at their schools. The answers ranged from needing cameras to making sure they worked properly after being installed. One principal because of location near a nuclear power plant has an air filtration system as part of the upgrades for technology and security.

Emergent Themes from Pre 1999 High School Principals

The emergent themes from the Pre 1999 High School Principals centered on wide open spaces and maximum visibility. Being able to supervise and monitor the large number of doors seemed to be of a major concern for this group with one principal explaining, "you may have to consider where your doors are, how they are secured, how many doors do you have, what are the access points, how visible are those access points, and are there other obstacles in the perimeter

of the building that allow for an intruder or some other type of safety hazard." Most of the schools have had no additional safety design elements since their initial opening. Pre 1999 Principals indicated the lack of visibility in locker rooms and restrooms as making them dangerous places in the school. These principals expressed the need for surveillance and cameras equipment that is flexible, with one principal stating, "I think surveillance is our special need just so we have visibility throughout the building because it is a large structure, and having that flexibility in the surveillance equipment to really focus on what we need to focus on." One principal cited door locks that allow for teachers to lock the classrooms from inside the classroom as pressing design needs in their schools. A lot of the concerns cited were design issues based on the age of the building. One principal disclosed the location of the school office as being problematic because it does not allow for seeing who is entering the building stating, "In the design of our school, one area that concerns me is that where our office is located, our visibility is somewhat restricted. The cameras and the door locks, the electronic door locks installed with cameras have helped, however we do not face the door so we don't initially see who may enter that door."

Group Two Newer High School Principals

The five high schools involved in group two of the three sets of interviews were selected because they were constructed after 1999. This was under the assumption that there might be some structural changes to the buildings because of the Columbine incident. Newer High School #1 was constructed in 2010 with a current student enrollment of 1450. Newer High School #2 was constructed in 2008 and had a student enrollment of 1200. Newer High School #3 opened in 2007. It had a student enrollment of 1180. Newer High School # 4 was built in 2008. It had a student enrollment of 871. Newer High School #5 was constructed in 2003. It had a student enrollment of 1350.

Synthesis of Newer High School Principal Interview Themes

Question #1 asked what is the most important design element component or feature in the school building to make the building safe?

Principal #1 reported the location of the school as the design element that makes the school safe. The old high school was located on a main throughway that had a lot of foot traffic that sometimes found its way into the school. The design of the new school allows for all doors to be secured at all times with the exception of two that are manned by two staff members from 8:00 a.m. to 1:45 p.m. each day. All traffic entering prior to 8:00 a.m.is directed through the office. The school has two-way communication phones in each class room. Administrator's offices are located throughout the building. In addition, the school has as over 80 cameras. Principal #1 also spoke of wide hallways and chest high lockers as being factors in making the building safe. In addition, a very visible leadership team is needed to complete the response to this question.

Principal #2 specified the ability to control access to the building as a design feature to make the school safe."By controlling access to the building you can create a safe environment." Principal #3 referred to security vestibules and controlling access from the outside as being factors in making the building safe. Principal # 3 also spoke of making sure exterior doors are secured, that students not prop open doors and providing one way in and one way out access to the building as a factors in making the building safe.

Principal #4 noted that large and wide hallways, a separate wing for academics and administration, which keeps separate the public from students as a factor in making the building safe. Principal #4 also indicated that limiting access to the building by providing one way in and one way out was a safety design factor.

Principal #5 stated "wide hallways to reduce congestion and lots of exits as factors in making the building safe." Also having lockers spread throughout the building is a factor that helps make

the building safe by helping to reduce clustering of students. Principal #5 also indicated, one entrance and exit into the school located in front of the main office and gates to section off parts of the building as well as two-way communication between the classroom and the main office as factors to make the school building safe.

Three of the five principals referenced wide hallways as a design element to make the school safe. All five principals specified access to the building in the way of security vestibules that provide for one in and one way out, as a design element to make the school safe.

Question # 2 asked have there been additional design elements added to the building that were not in place prior to the opening?

Principal #1 requested blinds to be installed as window treatments and also installed blackout curtains to block views during lockdowns. Principals #2, 3, and 4 disclosed no additional design elements have been added since the opening of the school.

Principal #5 indicated that additional cameras have been installed and poles have been added to the parking lot to support addition cameras in the parking lot. Special keys have been given to teachers who smoke that allow them to step outside of the building and return without compromising the security.

Three of the five principals reported no additional design elements have been added since the opening of the school. One principal noted the addition of blackout blinds and window treatments as added after the school was opened. One principal cited the addition of cameras and poles for cameras to be located in the parking lot.

Question #3 asked, what is the most dangerous place in the school building? Are there ways to design these places to minimize danger?

Principal #1 stated there were no dangerous places in the building.

Principal #2 referenced stairwells with limited visibility and locker rooms and restrooms as being dangerous places.

Principal # 3 reported the sophomore locker bay as the most dangerous place in the building because large numbers of students have tendency to cluster in this area.

Principal #4 characterized any area that can't be seen very well as the most dangerous place in the school. They have added convex mirrors in stairwells to assist with being able to see in hidden areas.

Principal #5 simply stated locker rooms as the most dangerous places in the school building.

There were mixed responses to this question. Two of the five principals stated visibility, or lack thereof, as creating the most dangerous place in the building. One principal reported there were no dangerous places in the building and the last principal indicated that locker rooms were the most dangerous place in the building.

Question #4 asked, what is the most pressing safety need in your school?

Principal #1 stated concerns about students opening the school doors to allow outsiders in the building. To counter this, the school has a security guard who walks and checks doors to be sure they are secure.

Principal #2 explained educating children to not allow outsiders into the school building. Also a teacher was found to have propped a door open with a stick allowing outsiders who had been turned away from the front door to enter the building.

Principal #3 indicated the repurposing of staff to provide for additional supervision was the most pressing safety need for the school. The principals felt that the central office staff should make some designated teacher's quasi-administrators to assist with the supervision duties that are required.

Principal #4 reported a large number of doors that are clearly seen by cameras yet allow for students to leave the building or allow for them to prop the doors open. The school has constant patrols by teachers and custodial staff to check that doors are secured.

Principal #5 expressed that a second School Resource Officer is the most pressing safety need in the building. Also making sure all doors are locked and secured at all times. The back door locks require that in order to remove your key the door must be locked. The addition of cameras in the parking lot is another pressing safety need.

Four of the five principals referenced students leaving doors open or opening doors for outsiders as the most pressing safety need in their building. One principal referred to the need for repurposing of staff to increase the number of persons responsible for supervision as the biggest safety need.

Question#5 asked what safety activities your school does best?

Principal #1 pointed out the school takes its emergency drills very seriously. Virginia public schools are required by state policy to have four fire drills in the first month of school and tornado drills and the school does follow these guidelines.

Principal # 2 indicated that the school staff supervises students very well. They practice the standard drills. The school had not had an intruder drill during the time the interview was done.

Principal # 3 cited "we have some pretty good preventive steps in place." The school practices the tornado drills, fire drills and intruder drills that are taped by the police department.

Principal # 4 stated it is what they do best is when they have emergencies in the building. Drills are practiced and students exit the building quickly. There is a manual entitled Standard Operation Procedures that was developed by the Crisis Team. All staff and substitutes are aware of the contents and requirements.

Principal #5 reported that the school does the tornado, fire, and lockdown drills regularly. There is a safety committee at the school that make suggestions and recommendations on issues of things that can be improved and reinforcement of things that are done well. The school distributed diagrams to staff to assist in what to do in the case of any emergency.

All five principals indicated they practiced all of the standard drills to include: fire, intruder, tornado and lockdown drills. All principals alluded to the state requirements for fire drills that must be met monthly.

Question #6 asked, what are the biggest physical barriers to improve school safety measures?

Principal #1 had no answer but did speak of a large number of windows that allow people to be seen from the building but the windows also allows for being seen by persons on the outside.

Principal #2 cited the large number of windows and doors as being a safety concern. Principal #2 explained that the superintendent of schools wanted maximum sunlight for the building because of his knowledge of research studies that have shown that sunlight has a positive effect on academic achievement. As a result, the superintendent wanted the buildings have more window space.

Principal # 3 explained the biggest barrier to improve school safety measures are doors. Students have a tendency to prop them open to allow outsiders into the building. Principal # 3 also spoke of the building having two stairwells that are located at both ends of the hallway as a design issue. Principal #3 further indicated the school needs an elevator or stairwell in the center of the building. Not having these creates an issue of timeliness when having to respond to activities on the second floor.

Principal # 4 referenced a design flaw in the office that consists of a wall that is too high to allow for persons in the main office to see without standing if the persons are short of statue.

Principal #5 disclosed money as the biggest physical barrier to improve school safety measures, indicating the need for more cameras if they had more money.

Three of the five principals specified issues with windows and doors as the biggest barrier to improve school safety barriers. They spoke of large windows that allow students and faculty to be seen inside of the building by persons outside the building. In addition, the large numbers of doors that have to be constantly supervised were barriers that were identified by principals. One principal reported lowering a wall in the main office to accommodate persons in her office that are too short to see over the wall. One principal stated money as the biggest barrier to improving school safety barriers. The school is in need of additional cameras and money is what is needed to solve that dilemma.

Question#6 asked what other factors regarding design do you believe affect school safety?

Principal #1 stated that they designed the way the office is set up to insure that the secretaries are looking out to visitors as they enter the building. The other schools in the county have been designed with different configurations that have the secretaries with their backs to the public.

Principal #2 reported lots of open space and the location of the lockers in areas deemed as locker bays as being design features that would help make the school safer. These areas are spread out to reduce congestion. The principal also indicated having 96 cameras as well as utilizing them effectively as a factor that affects school safety.

Principal #3 cited design factors that allow for gathering spaces for students that still allow for them to be supervised.

Principal #4 noted the need for adequate space as well as the smooth flow of traffic that does not allow for bottlenecks.

Principal #5 reported not only the ability to sell the importance of school safety to the students, but also good communication as factors that affect school safety. Principal #5 expounds upon

this with the following statement: “Well, I think a lot of it is number one, to help that design you’ve got to up that visibility. And you have to talk about communication, and you got to talk about not blocking communication. You know, make sure you have radios.”

Three of the five principals stated that having wide open spaces in the building allows for good supervision and visibility. One principal reported a wall that needed to be lowered and one principal spoke of supporting the design of the school by increasing the visibility and communication.

Question # 8 asked what role does the physical design of the school play in school safety?

Principal #1 explained that the physical design has a great role. With all the windows in the school, they are able to see who is coming and going.

Principal # 2 specified it is not so much the physical design but the way the design is utilized. Everything is funneled through the front. The principal doesn’t believe that security was a paramount concern in the design of the building because of the large number of doorways and entrances into the building that now present safety concerns to the faculty and administration.

Principal #3 stated “I think you’ve got to” strike a balance in the physical design of your school. Principal #3 cited the need to strike a balance between the design of the school and making it look and feel like a prison.” He added, “One must be mindful of the amount of glass and ways to enter the school building. If there is only one point of access, and that is terribly inconvenient to get into and out of, then you’re going to have a whole other set of problems.”

Principal #4 explained the manner of getting in and out of the building and the smooth flow of student movement about the building is a safety concern.

Principal #5 expressed that to assist the design features one has to increase the visibility and communication. “I think the whole thing as far as school safety is being able to sell the importance of it to your staff and students.”

Two of the five principals spoke about the large number of windows in the building. One principal spoke in a positive sense in that they are able to see persons coming and going. The other principal explained the large number of windows as a security flaw in the sense that it was felt that the large number of windows don't support a secure environment because of persons inside the building being visible to outsiders. Three of the principals spoke of ways to enter the school building and the smooth flow of traffic inside the school as design features that promote safety.

Question#9 asked what design features in the school that have been incorporated to accommodate technological upgrades for safety and security?

Principal #1 stated that changing the positions of the cameras to give the most efficient overview was a design feature that has had positive results in safety and security.

Principal #2 referred to cameras and an alarm system as the design features that have been incorporated to accommodate technological upgrades for safety and security.

Principal #3 expressed at the opening of the school, school administration was short of money and because of that cameras were limited to 16 which the principal stated was too small a number for a school that large.

Principal #4 explained the way the building was designed to allow all business that involves students to take place outside of the academic areas. This allows for activities that involve the clinic and guidance areas to be separated from the academic wing of the school. This prevents assess to students.

Principal #5 spoke of cameras and alarms to alert students to things going on in the building as being positive design features to promote safety. The principal also stated that television monitors located around the building help to assist with getting out information.

Four of the five principals referenced cameras and alarms as technological upgrades. One principal, in reference to cameras, cited them because of only having 16 cameras for a very large school environment. One principal noted the location of the office away from the academic wing of the school.

Emergent Themes from Newer High School Principals

Themes from the newer high school principals seem to center around wide open spaces and wide hallways that support the smooth flow of traffic inside the school. One principal cited large hallways as the most important design element to make the school safe stating, "In the old school it was very congested and when we designed this school we to make sure that we had enough space where our school population would not be cramped all together." Security vestibules and ways of monitoring who enters the school and controlling access to the building were emergent themes. One principal cited, "Its access. I think when you have a way of controlling access to your school building you create a much more safe environment." A large number of doors and windows were referenced as concerns that affect school safety. Most of the concerns centered on the large number of doors, the ability to control access, and student issues of propping the doors open to allow outsiders in. For some principals, though, overabundance of windows was problematic because of persons being able to see inside the building. One principal saw large amounts of windows as a positive in the sense that large numbers of windows allow for outsiders to be seen. Much of the conversations with the newer high school principals however, centered on controlling access to the school buildings. Cameras were cited by several principals as components that assist in making the school safe. One principal stated, "We have over eighty cameras, which we can monitor about anything that goes on in this building." Another principal revealed, "Kids understand we have ninety-six cameras. We use them effectively… and that is

the one thing that I know when we designed the building that was forefront because in the old building the cameras system was not that great."

Synthesis of Architect Interview Themes

Question#1 asked what is the most important design component or feature in the school building to make the school safe?

Architect #1 reported, "I would say that one of the simplest and most important in organization of school safety is that number one, make it easy to get around and be supervised." He also reported that older school models with small narrow halls and lockers on each side of the hall as being cramped and problematic as opposed to new designs that have large wide hallways. Architect #1 added, "Number two, I think, is the notion of passive security where you've got a lot of glass, a lot of student teacher offices that open up into student spaces that. Stairwells that have glass in them, so there may not be any adults watching, but the students don't know that, and they, they kind of get a sense that adults may see what they doing. In addition, he referred to stairwells with glass in them to support visibility as a design component to make the school building safe.

Architect #2 explained, "Probably the number one is just the entry sequence into the building. Um, we hear a lot about that today from school systems about making sure that there's good control over who can enter the building. And, ah, so providing entrances in a way that make it, it being visually seen, and then eventually force the visitors to have to come into the controlled offices or waiting area. Um, as opposed to penetrating deep into the school before they're there behind the administrator's desk. That's probably number one."

Architect # 3 expressed the following: "I think one of the things that, really, we try to use in designing our schools is the idea of transparency, and that has a lot to do with not just the

entrance, but also the perimeter envelope of the building. Ah, specifically, the entrance, I think you want to be able to, see people coming, and we always think of it as 'see and be seen' so that those inside the school feel safe because they can see what's going on outside, and those coming to the building feel secure because they know they're not in a blind spot." Architect # 3 also stated the location of the administrative suite as a design component to make the school safe. Older schools had offices that allowed for persons entering the school to penetrate deeply into the school building before arriving at the office. Newer school designs create a vestibule of doors that create a sequence of being able to enter the building that is staff controlled. It normally involves two sets of doors, with entry into one and being able to be let in from the second set of doors.

Architect #4 specified, "Well there are a number of them, but ah, some of the most significant ones are to maintain ah, the clear path of sight lines through the building with no hiding spots, uh, and what we like to see in school design is an identifiable front entrance. From the main office and the hallways that are ah, that you can monitor from central locations. Where you have the hall monitor or an administrator can stand in a strategically, ah, place and find and ah, see most of the building from a very few, different vantage points." Architect #4 further spoke of secured entrances with security vestibules as being valuable features for good safety.

Architect #5 stated, "Building a clear line of sight from different parts, um, and what we try to avoid is corners that cannot be seen around, and just areas where whoever is occupying the space thinks that they can't be observed or supervised." Architect #5 also reported the general layout of the building that allows one to direct persons where you want them to be as a feature to make the school safe.

All five architects referenced visibility, in some form, as the design component or feature that makes the school building safe. Three of the five architects reported either entry sequence or

being able to control who enters the building as the design component that makes the school safe. Visibility, controlling access to the school building and maintaining clear lines of sight were the overall responses to question #1. Three of the five architects noted the width of hallways as being a design component that supports a safe school.

Question#2 asked have there been additional design elements added to buildings now that were not in place prior to 1999?

Architect #1 pointed out, "Yeah, there's in fact a lock you may or may not have heard of that is called the Columbine lock, ah, for classrooms." This lock allows for the teacher to lock the door from the inside of the classroom. Architect #1 also indicated that while there were cameras prior to 1999, it is believed that active security is much more prevalent today. Architect # 1 also indicated that technology is improving regarding design elements that have been put in place since 1999. Architect #1 spoke of a system that allows for doors to be accessed through a card reader in which you swipe a card for access. These cards can be deprogrammed if lost, which unlike a key, does not require replacement or duplication.

Architect #2 specified, "That is something that probably was always important, at least in my career, to get the administrative area kind of positioned properly in the main entrance. Position properly in terms of the actual physical constraints of who can enter the building. That is something that I would say happened in the last ten years."

Architect #3 reported, "Well, I would say yes. We've seen much, ah, much discussion centering around one, which is just recording the events that go on with surveillance cameras." Architect #3 also indicated that one of the big changes is the approach to entry into the building. There is a lot more supervised entry with cameras, voice intercom and card readers to access the school building. He explained a great deal of emphasis being placed on security cameras as well as security forces and Resource Officers stationed in the schools.

Architect #4 stated, “Yes, specifically we’ve seen a great deal of emphasis being put on security cameras in schools. We did one high school where there were over ninety different cameras locations in the school and, they are fed into a specific room with the equipment. In it, everything is video tape monitored so, there’s not someone who stands by and watches the screens all day long.” He also mentioned limiting access to the building by the use of security doors that allow for controlled entry to the school building.

Architect #5 stated, “I sense that some of the more active systems are becoming more common in barriers, a sense of locking doors, and that’s one thing where the administration can actually control who’s coming in and how they’re coming in.” Also the ability to control who enters the school building and how they are directed upon entry to the building as the design elements that have been most prevalent since Columbine.

Regarding design elements that were not in place prior to 1999, three of the five architects cited cameras as design elements that are much more prevalent since 1999. The ability to lock classrooms from inside the class was cited by one architect. All five architects referenced controlling access to the building by use of card readers and security cameras on door entrances to allow persons to be seen prior to entering the school building.

Question #3 asked what is the most dangerous place in the school building? Are there ways to design these places to minimize danger?

Architect #1 stated, “Ah, I think any gathering place is a potential conflict area. Ah, sometimes you see cafeterias, certainly locker spaces, and I talked about particularly when they are in corridors.” Architect #1 also indicated that stairwells that are too narrow can create bottlenecks that impede the flow of student traffic. “Locker rooms also can be problematic because of limited space and any space on the school where there is a nook or cranny, you might

call it, isolated hallway, a hidden corner, is potential places for things to occur that should not go on."

Architect #2 stated "locker rooms are probably one of those areas that could be kind of tough because they can be almost labyrinth in or maze-like sometimes in their construction, and so the visibility is reduced."

Architect #3 responded that there are a couple of places he is concerned about, one being bathrooms. "It may not be as big of an issue, but as you get into middle school and high school, you know, all sorts of shenanigans go in the bathrooms." And, you know, that's not the kind of place that you're going to feel comfortable looking at surveillance cameras." The other issue is locker rooms in high schools. They need to be built to include a line of sight to provide supervision. In addition, making sure corridors are wide enough and the pooling of lockers away from corridors to eliminate reducing the width of the hall by having lockers on both sides of the hall helps to minimize dangerous places. Schools need to be built without curved hallways to increase the line of sight in all directions.

Architect #4 responded by saying, " you know , some of the things that come to mind in that area are, um, outdoor courtyards, um, that are enclosed or which are limited to view which would illuminate outdoor courtyards. "You know they are a great phenomenon, amenities for schools, and they are a great teaching amenity as well, but some of them are not designed properly." "They are not open to view." Architect #4 further stated that mechanical courtyards that are utilized to hide dumpster locations can be sources of danger in that they can be hiding places for intruders. Tight hallways can be a dangerous design that impedes student traffic. Entrances that are flush to the building to eliminate hidden spots assist with a safe design.

Architect #5 stated, "I don't think I can take one space as being more dangerous because of what kind of space it is or its use." "The majority of the spaces that are dangerous are the ones where

individuals may be or small groups, and they would not have safe supervision." Architect #5 also cited small access ways between spaces are probably more dangerous than a large space if there is no ability to be seen.

All five architects referenced visibility in some form as to what can lead to the most dangerous place in the school building. Locker rooms and restrooms were reported by three architects as being a place of danger. Three of the five architects spoke of narrow hallways that can impede student traffic as being areas of concern.

Question #4 asked what are the biggest barriers to improve school safety measures?

Architect #1 stated that the average high school is approximately 250,000 square feet. "That is a lot of space to supervise and know where kids are, and know where outsiders are coming into it." Since Columbine, almost all schools have a security lock that allows for access when students are coming to school but is secure once all students have arrived. This forces visitors into a secure vestibule to be allowed into the school building.

Architect #2 responded by stating, "You've got to require balance and common sense." He explained in designing a school, the safety audit team wanted to remove a window from the cafeteria because of the fear of a sniper shooting into the cafeteria." This window would be removed and it would deprive the students of a nice atmosphere and a view outside of the cafeteria." The concern of the architect is if there is someone who is bent on harming students then the students can be harmed in going from the bus to the school. In the mind of architect #2, an art of balance is the biggest physical barrier to improve school safety measures.

Architect #3 indicated the following: "I think that it would help if, as you're doing right now, creating research on what the practices are. " "There is the group or concept called CPTED. It's about reducing crime prevention through environmental design. I think one of the things that, I don't know if it is a physical barrier, but I understand through a lot of research that making

personal connections with kids from the adults, can really reduce a lot of the bullying and the other issues that go on. So it might not just be physical barriers, but also, the social construct within a school and how well that's handled as much as it is the physical environment."

Lockers, recessed entrances and enclosed courtyards are also features that Architect #4 stated are barriers to improve school safety. "Those are things that have been designed in schools that cause problems that some school systems are going back to try to retrofit and, to modify those areas in the sake of school safety."

Architect #5 expresses this saying, "I have found that the bigger schools, like the high schools, they are not replaced that often. They're going to be there for at least fifty years ah, if not ninety. So if you have physical conditions that make safety and observation more difficult it's going to be difficult to make those changes that can be made. It's going to take greater effort and greater steps, sometimes building configuration makes it difficult because of separate buildings and exterior any solution there requires building additions or major reconfiguration of interior faces that just comes at a greater costs." Architect #5 specifically spoke of relocating the office in older buildings to have all traffic entering the building to funnel one way in and out. Architect #5 also spoke of the need to have optimum visibility in the relocated offices to observe those persons entering the building.

All responses to the question of what is the biggest barrier to improve school safety measures were different. The answers of the architects ranged from the large amount of square footage that has to be supervised to establishing a balance of common sense. Also mentioned by Architect # 5 were physical conditions of the school that can make safety and observations of students more difficult. If there was an overall theme from question number 4 it appears to be the lack of visibility as a barrier to improve school safety measures.

Question#5 asked what design features have been incorporated to accommodate technological upgrades for safety and security?

Architect #1 spoke of a high school with 360 degree cameras that can look out in all four directions as the design feature incorporated to accommodate technological upgrades for safety and security. These type of cameras obviously reduce the number of cameras needed, which drives down costs. “What we are also seeing in the design community is I.T.(Informational Technology) based, internet protocol based cameras which are a whole lot better and more flexible than the earlier cameras that are not internet based as a design feature that has been incorporated as an upgrade for safety and security.” These cameras run directly off the network which makes it very easy to add and move cameras.” He spoke of a high school with 360 degree cameras that can look out in all four directions as the design feature incorporated to accommodate technological upgrades for safety and security. These type cameras reduce the number of cameras needed.

Architect #2 explained, “Well, a big one would be obviously cameras, the security system. And of course there’s always a way of applying electronic access, um, like access doors and card readers and things that can track who it were that entered a door or didn’t enter a door and so forth.”

Like Architect #1 and # 2, Architect #3 also reported the use of cameras, but added special key hardware and intercoms for entry to buildings as design features that have been incorporated to accommodate technological upgrades for safety and security.

To elaborate on this, Architect #4 reported, “Security systems and use of the electronic card reader, whereas everyone who enters the building is recognized and recorded as the design feature incorporated to accommodate upgrades for safety and security.”

Architect #5 noted, “A lot of the times, their electronic switching and control of the door hardware are pretty common now. It’s much more used than it was before.” These systems allow for the doors to be electronically locked during school hours, or after hours, so that any visitor would have to come through one of the designated points. Cameras were also specified as a technology upgrade for safety and security.

All five architects’ referenced cameras as the design feature incorporated to accommodate technological upgrades for safety and security. Three of the five architects also cited special key hardware, electronic card readers, and security systems that control access to the building. Question #6 asked if the federal government or state mandated any added or different safety designs since 1999 that must be incorporated in schools.

Architect #1 stated, “I’m not sure how to answer that. I mean I know how, what I think. Um, I think the answer is we’re not aware of any.” “Um the federal regulations that we meet are really aligned to building codes, energy code, E.D.A. accessibility, that sort of thing.” “Not so much safety and security.”

Architect #2 reported that, “The state has not mandated any changes. “The state government has actually removed the teeth of the Department of Education to enforce anything.” “They essentially are just guidelines.”

Architect # 3 explained, “I’m not aware. There may be, um, I would like to find that out myself.” “The hardware function that it used to be that the classrooms could only be locked from the outside with the keys the teacher had. “That was because they didn’t want kids getting in the classrooms and locking them, so the traditional classroom function lock has been changed now.” “You can actually lock it from inside the classroom in the event that there’s an issue, you know, another issue similar to Columbine.”

While Architect #4 noticed the installation of modern security systems, he was unaware of their being mandated. "One of the things that we've seen is probably the security systems that are going into buildings now." "I don't know who is actually mandating whether it's the feds or the state. But, the security systems that go in must be installed, ah, by an accredited, certified installer."

Like Architect #1 and # 3, Architect #5 noted, "I'm not aware of a design mandate. But I do know that all schools we work with do have safety plans in place that are sent back to the state."

Three of the five architects were unaware of mandates; one had noticed current security systems but didn't know who mandated them. The fifth reported there were none.

Question # 7 asked do you think schools designed after 1999 are generally safer than those designed before that date, and if so, in what ways?

Because of traumatic and unfortunate events like Columbine, schools are now, invariably more aware of safety as an effort to preclude similar occurrences. Architect # 1 supports this, "I don't think there's any question that they're safer, um, just because of realization of some of these issues. I think it has to do, and I've discussed, um, we have active security, the technology kinds of things that are available certainly helps, but we have seen a trend to this notion of bigger spaces, wider corridors, more glass, more supervision, more visual supervision of things and the security vestibule."

The manner in which schools handled safety today is not only a reflection of how they fell short of optimum security in the past , but also what has been attempted to rectify those mishaps. Architect #2 explained, "That contemporary designs are safer now than those prior to 1999 stemming from concern for controlling access to the building. One of the things that we didn't talk much about was just reducing the places someone can hide even on the exterior of the building."

Architect #3 stated, "You know, I think they are. I think jurisdiction planners and architects are being a lot more sensitive, not only to issues like the Columbine issue that, um even in Northern Virginia and Maryland where you had the issue of the sniper that's driving along."

Not surprising, the design community has adapted devices as a result of their sensitivity to and perspicacity concerning school safety and security. Architect #4 observed, "There's no doubt in my mind that they are safer. There's a lot more awareness now that there ever has been, and most of the things we have talked about here is a result of the unfortunate incidents that we've had in the past.

Columbine, of course heightened school's awareness of the need for improving school safety Architect #5 stated, "There are certainly some schools, even the ones that were built in the 20's and 30's, that are very usable with very good plans and they contribute to our base school operations." He also noted that the Columbine incident raised the awareness of if something should happen we urge the school system to try to develop plans and procedures to be prepared for the incident. The awareness is being raised has made this a more important issue in the design of schools.

All five of the architects felt that schools designed after 1999 were generally safer than those schools designed prior to 1999. Three of the architects spoke of realization or more awareness of safety concerns as a result of incidents such as Columbine. In addition to being more aware of safety and security issues one architect stated wider hallways, more glass to increase visibility and security vestibules. One architect spoke of higher concerns for controlling access to the building as a way that schools built after 1999 are generally safer than schools built before 1999.

Emergent Themes from Architects

The emergent themes from architects centered on visibility, being able to see students to effectively supervise them. One architect discussed it being "significant to maintain the clear path of sight, line of sight through the building, with no hidden spots." Likewise another architect stated, "Building a clear line of sight from different parts, and what we try to avoid is corners that cannot be seen around." One architect cited, "I would say that one of the simplest and most important in organization of school safety is that number one, make it easy to get around and be supervised." The architects also spoke of controlling access to the buildings by providing security vestibules, the use of electronic card readers and cameras on doors. Stated one architect, "specifically, we've seen a great deal of emphasis being put on security cameras." A response from one architect was as follows, "Probably the number one is just the entry sequence into the building. Providing entrances in a way that make it visually seen and then eventually force the visitors to come into the controlled offices or waiting areas as opposed to penetrating deep into the school before they're behind the administrator's desk. That's probably number one." Locker rooms and restrooms were reported as places that could be dangerous because of design issues revolving around visibility. Visibility was a recurrent theme from the architects, being cited in four of the seven interview questions asked with one architect suggesting, "I think you want to be able to, see people coming and we always think of it as 'see and be seen' so that those inside the school feel safe because they can see what's going on outside, and those coming to the building feel secure because they know they're not in a blind spot." The realization of issues, such as a Columbine incident that have impacted school safety and the overall awareness of safety and security were referenced by three of the five architects as emergent themes.

Explanation of Data

The data reveals that school safety is an important issue for both high school principals as well as architects who design schools. Visibility and the ability to clearly see and supervise students in large groups were recurrent theme of the data but also consistent points of discussion in all three groups of interviews. The ability to clearly see and supervise students in large groups was a re-occurring theme of the data. Technology and cameras were discussed with every individual who was interviewed. Also discussed by all participants was controlling access to the school building either by way of security vestibules that direct traffic to the main office or by the large number of doors that have to be supervised throughout the facility. The data also revealed that all participants felt wide corridors and open spaces that provide for sight lines in all directions help to promote a safe environment. The data collected also supports that all schools practice routine drills as part of developing and maintaining a safe school environment. The data suggests that architects have a firm sense of the design issues that support a safe school environment and their perspective focused a great deal on the technological features incorporated in schools to support a safe environment. The responses from the architects closely mirrored each other in the majority of the questions asked. They collectively involved new design issues that have been incorporated since Columbine. The architects' responses to the question of whether schools today are safer than those designed years ago overwhelmingly suggest that they are safer environments because of the lessons we have learned as a result of incidents such as Columbine.

Chapter 5

Introduction

Chapter 5 contains the interpretations, conclusions and recommendations developed as a result of the qualitative study done to examine the perspectives of high school principals of high schools built prior to 1999 and high school principals of high schools built in the past five years, as well as perspectives from architects that design schools on the physical designs that support a safe high school.

Description of Data

The data collected for this qualitative research study was obtained from three groups of individuals. Five high school principals of schools built prior to 1999 and five high school principals of high schools built in the past five years. A group of five architects that design schools were also interviewed as part of the data collection. Data collection consisted of recorded and transcribed interviews from a select group of questions tailored for each group of participants. That data were then analyzed and emergent themes were generated from the results of the transcribed interviews.

Summary of Findings

Columbine was the acknowledged catalyst for a new focus on school security and it's had a major influence on new construction of school buildings and the renovation of existing school buildings. The primary purpose of this paper was to collect and examine perspectives of high school principals and architects who design schools on design elements that support a safe high school. By researching physical designs that influence safe physical learning environments, school buildings can be designed, built and renovated with particular design elements or features that support a safe environment.

The main research question for this study was: What are the design elements that principals and architects believe promote a safe high school? The sub-questions guiding the study are:

1. What design elements would an architect think influence school safety?
2. What design elements would a high school principal think influence school safety?

Qualitative methods of survey research were utilized to collect, analyze and interpret the data regarding the perceptions of architects and principals on the design elements that influence safety in select old and new high schools in the Commonwealth of Virginia. The focus was on select high schools built prior to 1999 and those that have been constructed after 1999.

Data collection consisted of recorded and transcribed interviews from a select group of questions that were tailored for each group of participants. These data were analyzed and emergent themes were generated from the results of the transcribed interviews.

There were three separate streams of data collection utilized in the research study (pre-1999 principal interviews, post 1999 principal interviews and architect interviews). Several common emergent themes were developed as a result of the three groups of interviews done.

Common themes from all three groups focused on wide open spaces that increase visibility and hallways wide enough to support a smooth flow of student traffic. All three groups cited visibility as a common theme that supports a safe school environment. Citing the ability to see who enters the school and the ability to be able to supervise students in large groups by being able to observe their activities as important to a safe school environment. **All three groups cited controlling access to the school building by use of security vestibules that allow for screening those persons who enter the school building as a common theme. All three groups mentioned cameras to record and provide surveillance as factors that help support a safe school environment.** Some school buildings had adequate numbers of cameras that were effective. Some schools had cameras but they did not work properly because of fixed

positions that don't allow for viewing the areas that need to be viewed. Some principals spoke of not having enough cameras to support a safe environment. All three groups seemed to agree that the use of cameras to record incidents and events were keys to support a safe school environment. **All three groups spoke of the location of the school office as paramount to school safety.** The ability of staff to see who enters the school building and the ability to funnel visitors to the main office and not allow access to other parts of the school building was cited as crucial to a safe environment. **Restrooms and locker rooms were cited by the majority of the three groups as potential places of danger because of visibility issues as well as design issues.** Principals did acknowledge that the ability to visually supervise any large wide open space that students gather in as important in providing for a safe school environment. Two architects spoke of old designs for restrooms that allow for one way in and out of the restroom and doors that prevent adults from seeing and hearing what might be going on in this enclosed environment. New designs of restrooms allow for no doors and a two way entry system. This design allows for easy access to the restroom as well as the ability to hear what might be going on in the restroom. **All three groups spoke of doors and windows and the ability to secure the large number of doors as problematic.** The doors being of specific concern because of the propensity of students and sometimes staff to prop doors open for re-entry or for allowing access from outsiders.

Table 1, illustrates the common themes from all three groups that were interviewed as part of the research study. It should be noted as it is not included in the table that six of the ten principals interviewed cited visibility as a constant theme to assist in making the school safe. The ability to see and be seen was a recurring theme with the majority of the principals.

Table 1

Common themes from all three groups that were interviewed as part of the research study

Theme	Pre 1999	Post 1999	Architects
Design elements or features to make the school building safe	Wide open spaces – controlling access	Wide open spaces, controlling access.	Wide open spaces – controlling access
Most dangerous place in the school building	Restrooms and locker rooms	Restrooms and locker rooms	Restrooms and locker rooms
Factors regarding design that effect school safety	Visibility	Visibility	Visibility
Design features in schools incorporated to accommodate technological upgrades for safety and security	Cameras	Cameras	Cameras
Biggest physical barrier to improve school safety	Doors and Door locks	Doors and Door locks	Doors and Door locks

Conclusion/ Discussion

The purpose of the study was to investigate and report the perceptions of high school principals of high schools built prior to 1999 and high school principals of high schools built after 1999 as well as the perceptions of architects who design schools on the physical designs that support a safe school environment.

The analyzed data found consistency in all three groups in their response to the interview questions. Consistent themes were presented by all three groups regarding physical designs that support a safe school environment.

In reviewing the available literature on physical designs for safe schools, the researcher found limited research on the topic. Because of the limited amount of research on this subject, literature was reviewed on studies involving student achievement, safe schools and physical conditions of school facilities. Previous research has found that building conditions affect student, teachers and achievement levels. Previous studies looked at design variables and achievement scores on the Iowa Test of Basic Skills (ITBS). This research determined that typically schools that look good from the outside also served the need of the students on the inside. This study continues the theme that seems to support the positive influence of design elements on student achievement.

Better school design can greatly increase the safety of children by creating environments that facilitate proper supervision. The review of literature provided data that relates building designs to student performance. In theory it seems to support the literature review in that if building design features influence student behavior and performance it can be concluded that safety features of a school can influence student behavior as well.

There was some input on two story buildings versus one story buildings. All of the buildings in the study were two story buildings. The design issues associated with two story buildings were

centered on the location of the stairwells. One principal cited the amount of time it took to respond to emergencies on the second floor because both stairwells leading to the second story were at separate ends of the school. The design needed a center stairwell to access the second floor. One interesting observation from one principal involved her stating that design issues were items over which principals had no control. They were more able to have impact on things such as the climate and culture of the school building.

It should be noted that in a recent press release of the Council of Educational Facility Planners International dated September 9, 2011that schools throughout this country are in desperate need of renovation. To address this growing need to upgrade our crumbling schools the President of the United States has placed in front of Congress, The American Jobs Act which calls for action to repair and update at least 35,000 schools. This act proposes to invest **$**25 billion in school infrastructure. This will not only create jobs but will improve American classrooms to meet 21st century needs of students. The press release contained information that indicated that 44% of principals reporting that the inadequate and poor conditions of their school buildings interfere with student achievement. The American Jobs Act will focus funding for emergency repairs and modernization as well as energy efficiency upgrades, upgrading technology, building new science and computer labs and implementing STEM programs to allow our students today, tomorrow, to compete in a global economy.

The Council of Educational Facility Planners International (CEFPI) is a very important professional organization whose primary function is improving the places where children learn. CEFPI involves a diverse group of professionals with one single goal – building healthy, safe high performance and sustainable learning environment that strengthen student and teacher performance.

Implications for Practitioners

Based on the findings of this study, there is a need to involve principals in the design phase of constructing schools. Two of the ten principals interviewed cited that physical designs of schools are areas that they feel is out of their control. These principals felt that they are better able to monitor things such as culture and climate of schools as opposed to the physical design of the facility. In the book entitled, Planning Educational Facilities: What Every Educator Needs to Know, author Glen Earthman, (2009) makes several recommendations in Chapter 13 on a Design Review Team that should consist of the principal of the school being built. The principal should know and understand the workings of a school building and how a school organization operates. As a result, the principal should be able to anticipate the effectiveness and consequences of certain designs in regards to the movement of students, program demands and requirements. This expectation is interesting because the average principal or educator has very little if any training in reading and interpreting architectural drawings. The expertise developed usually comes from actually reviewing plans to become familiar with architectural drawings as well as asking questions and listening to explanations. Too often, school administrators, school security officials and school resource officers are not involved in the initial processes of a new school design. These persons should be fully engaged regarding input from them to provide practical and useful designs that would facilitate education, safety and supervision. As principal it is important to attempt to anticipate the problems that can arise when the school is populated with students. Principal preparation programs should include training in designs that support a safe environment. Facility planning should be a required course of study for all principals.

Another recommendation to be made involves school boards and school superintendents. That recommendation is to have as policy the requirement to have safety audits performed yearly in

all school buildings where students and staff are housed. These safety audits should occur once a year. The process should also involve a committee that includes the principal, assistant principal, nurse, teacher, custodian, parent, director of maintenance, sheriff's deputy, and assistant superintendent of schools. Each member has a checklist and the list is reviewed by the principal to the entire committee. A tour of the facility is involved in the safety audits. Parent, teachers and students are interviewed as a part of the safety audit. Feedback is provided for each school location and repairs or items that were cited during the safety audit are scheduled and followed up on. A report of each school's audit is shared with the School Board.

Recommendations for Further Research

This study was limited to interviews with ten high school principals. Five high school principals of high schools built prior to 1999 and five high school principals of high schools built in the past five years. The study also included interviews with five architects that build and design schools. The following recommendations for further research into this phenomenon are presented:

1. A return to the ten research locations in five years to determine if the themes generated as a result of this research study are still relevant present or whether they appear to have been due to mitigating circumstances.
2. Replicate the study to include teachers and middle and elementary school principals to determine if the themes in the research study are common across the spectrum of public education.
3. Increase the number of pre and post high schools in the population to determine if themes are different and to compare the themes to this study.

4. Develop research to determine if providing adequate training of principals in the design process of school construction can lead to school designs that better support an optimum safe school environment.
5. Apply the research to a larger sample to include all public high schools in the Commonwealth of Virginia.
6. Apply the research to urban, suburban, and rural schools to see if the issues are different between those units.

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Appendix A

Virginia Polytechnic Institute and State University

Blacksburg, Virginia

Superintendent's Consent Form

Public Schools

My signature below indicates that I have read the information provided and I agree to allow the principal of _____High School to participate in the study entitled *Physical Designs for Safe Schools* to be conducted during the next thirty days starting in the month of January, 2011.

I understand the study is about physical designs that promote or retard a safe high school environment. This is an original research project, based on research literature on school designs. Principals will be asked to participant in an interview consisting of 5 to 8 open-ended questions that should take no longer than 60 minutes to complete.

No school time will be taken in the completion of the interview.

A potential benefit of the study is:

The findings of this study will help those persons who design and use schools to understand the physical designs that promote or retard a safe high school.

I agree to the following conditions with the understanding that I can withdraw the school division from the study at any time should I choose to discontinue participation.

- The identity of participants will be protected. No principal will be identified in the final report. Original data will be destroyed after research is completed.
- Information gathered during the course of the study will be analyzed and the findings may contribute to published research reports and presentations.
- There are no foreseeable inconveniences or risks involved in participating in the study.

- Participation in the study is voluntary and will not affect any performance evaluation. Should we decide to withdraw permission after the study begins, the principal will notify the investigator of our decision.
- A copy of the researcher report will be provided to the school division upon completion of this study.

There will be no compensation for participants in this study.

If further information is needed regarding the research study, I can contact: Roy H. Walton, Jr. at 804 519-6989 or email: walton.roy@nottowayschools.org or Glen L. Earthman at Virginia Tech: 540 231-9715 or email: earthman@vt.edu

Signature (Superintendent)_____(Date)_____

Appendix B

Virginia Polytechnic Institute and State University

Blacksburg, Virginia

Principal's Consent Form

My signature below indicates that I have read the information provided and have decided to participant in the study entitled: *Physical Designs for Safe Schools* to be conducted at my school.

I understand the purpose of the research project will be to determine physical designs that promote or retard a safe high school.

I agree to participate in an interview consisting of open-ended questions on designs in my school that promote or retard a safe environment.

A potential benefit of the study is:

The findings will help those persons who design or use schools to understand the physical designs that promote or retard a safe high school.

I agree to the following conditions with the understanding that I can withdraw from the study at any time should I choose to discontinue participation.

- The identity of participants will be protected. No principal or school will be identified in the final report. Original data will be destroyed after research.
- Information gathered during the course of the project will be analyzed and the findings may contribute to published research reports and presentations.
- There are no foreseeable inconveniences or risks involved in participating in the study.
- Participation in the study is voluntary and will not affect any performance evaluation. If I decide to withdraw permission after the study begins, I will notify the investigator of my decision.

No school time will be taken in the conduct of this study.

There will be no compensation for participation in this study.

If further information is needed regarding the research study, I can contact: Roy H. Walton, Jr. at 804 519-6989 or email: walton.roy@nottowayschools.org or Glen I. Earthman at Virginia Tech, Phone: 540- 231- 9715 or email: earthman@vt.edu

Signature (Principal)_____(Date)_____

Appendix C

Principal Interview Protocol

Interviewee (Title and Name):

_____

Interviewer:

_____

Introductory Protocol

To facilitate my note-taking, I would like to audio tape our conversation today. Please sign the release form. For your information, only researchers on the project will be privy to the tapes which will be destroyed after they are transcribed.

I have planned this interview to last no longer than one hour. During this time, you will be asked several questions that I would like to discover.

You have been selected to speak with me today because you have been identified as someone who has a great deal to share about safety designs that promote or retard a safe high school.

A. Interviewee Background

How long have you been …

_____ in your present position?

_____ at this school?

1. Specifically what is the most important design element, component, or feature in the school building to make the school safe?

   Probes: Were you involved in the design phase of this school? If so, what was your involvement?

2. Have there been additional design elements added to your buildings now that were not in place prior to 1999?

   Probes: Has there been any design work since the initial construction?

3. What is the most dangerous place in the school building? Are there ways to design these places to minimize danger?

   Probes: Discuss the problem areas of the building where constant supervision is necessary and why?

4. What is the most pressing safety need in your school?

   Probes: Why?

5. What safety activities does your school do best?

6. What are the biggest physical barriers to improve school safety measures?

   Probes: How can barriers be overcome?

7. What other factors regarding design do you believe affect school safety/

8. What role does the physical design of the school play in school safety?

9. What design features in the school have been incorporated to accommodate technological upgrades for safety and security?

   Probes: Why were they incorporated? Was there a particular incident that caused the upgrades?

Appendix D

Architect Interview Protocol

Interviewee: (Title and Name):

_____

Interviewer:

_____

Introductory Protocol

To facilitate my note-taking, I would like to audio tape our conversation today. Please sign the release form. For your information, only researchers on the project will be privy to the tapes which will be destroyed after they are transcribed.

I have planned for this interview to last no longer than one hour. During this time, you will be asked several questions that I would like to discover.

You have been asked to speak with me today because you have been identified as someone who has a great deal to share about safety designs that promote or retard a safe high school.

Interviewee Background

How many schools have you designed?

1. Specifically what is the most important design element, component, or feature in the school building to make the school safe?

   Probes: Are you involved in the design phrase of school buildings? What is your involvement regarding designing school buildings?
2. Have there been additional design elements added to buildings now that were not in place prior to 1999?

3. What is the most dangerous place in the school building? Are there ways to design these places to minimize danger?
4. What are the biggest physical barriers to improve school safety measures?

   Probes: How can barriers be overcome?
5. What design features in the school have been incorporated to accommodate technological upgrades for safety and security?

   Have you overseen these types of upgrades?
6. Has the federal government or state mandated any added or different safety designs since 1999 that must be incorporated in schools?

   Discuss those mandates that you think should be in place that are not?
7. Do you think schools designed after 1999 are generally safer than those designed before that date? If so, in what ways?

Appendix E

Common Interview Questions

1. Specifically what is the most important design element, component, or feature in the school building to make the school safe?
2. Have there been additional design elements added to buildings now that were not in place prior to 1999?
3. What is the most dangerous place in the school building? Are there ways to design these places to minimize danger?
4. What are the biggest physical barriers to improve school safety measures?
5. What design features in the school have been incorporated to accommodate technological upgrades for safety and security?
6. Has the federal government or state mandated any added or different safety designs since 1999 that must be incorporated in schools?
7. Do you think schools designed after 1999 are generally safer than those designed before that date? If so, in what ways?

Appendix F

Virginia Polytechnic Institute and State University

Blacksburg, Virginia

Architect's Consent Form

My signature below indicates that I have read the information provided and I agree to participate in the study entitled *Physical Designs for Safe Schools* to be conducted during the next thirty days starting in the month of January, 2011.

I understand the study is about physical designs that promote or retard a safe high school environment. This is an original research project, based on research literature on school designs. You will be asked to participate in an interview consisting of 5 to 8 open-ended questions that should take no longer than 60 minutes to complete.

A potential benefit of the study is:

The findings of this study will help those persons who design and use schools to understand the physical designs that promote or retard a safe high school.

I agree to the following conditions with the understanding that I can withdraw from the study at any time should I choose to discontinue participation.

- The identity of participants will be protected. No architect will be identified in the final report. Original data will be destroyed after research is completed.
- Information gathered during the course of the study will be analyzed and the findings may contribute to published research reports and presentations.
- There are no foreseeable inconveniences or risks involved in participating in the study.
- Participation in the study is voluntary and will not affect any performance evaluation.
- A copy of the researcher report will be provided upon completion of this study.

There will be no compensation for participants in this study.

If further information is needed regarding the research study, I can contact: Roy H. Walton, Jr. at 804 519-6989 or email: walton.roy@nottowayschools.org or Glen I. Earthman at Virginia Tech: 540 231-9715 or email: earthman@vt.edu

Signature (Architect)_____(Date)_____

VirginiaTech

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MEMORANDUM

DATE: February 7, 2011

TO: Glen Earthman, Roy Walton Jr.

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires October 26, 2013)

PROTOCOL TITLE: Physical Designs for Safe Schools

IRB NUMBER: 11-018

Effective February 7, 2011, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: **Expedited, under 45 CFR 46.110 category(ies) 6, 7**
Protocol Approval Date: **2/7/2011**
Protocol Expiration Date: **2/6/2012**
Continuing Review Due Date*: **1/23/2012**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Date*	OSP Number	Sponsor	Grant Comparison Conducted?

*Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

cc: File